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## Autistic Gestures

An Experimental Study in Symbolic Movement

BY

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## CHAPTER ONE

### OBSERVATION TECHNIQUES IN THE STUDY OF BEHAVIOR

Darwin (8) had long ago observed that motor movements of individuals constitute a fertile and significant field of study. Recently Oseretzky (33) has offered a systematic classification of techniques suitable to the study of motor movements. This classification includes what he calls *motoscopy*, *motometry*, and *motography*. The studies thus far made do not actually fit into such a classification. Overlapping in the older studies is considerable, and new techniques already suggest the need for a revision of Oseretzky's categories.

*The study of subjective process through explicit movement.* Scripture (39) in 1898 pointed out that nasal whispering, even though unnoticeable to the naked eye, exists, and can be detected by concave metal mirrors. Jastrow (17) in 1900 advocated the use of the automatograph, finding that there is a marked correlation between the direction of attention and involuntary muscle movements. Titchener (45) in 1901 was one of the first to study the relation of sensory and affective qualities to involuntary muscle movement. Pfungst's (37) work with Clever Hans disclosed not only that the head-jerk in human beings varies from one-fifth to one-fourth of a millimeter, but proved that the minutest kinds of jerks can actually be perceived by trained observers. Whipple (49), in his studies of steadiness in motor control, found that there were motor tendencies in thinking as well as tendencies toward "automatic" movement. With the aid of the tridimensional analyzer of Sommer, he proved that these motor tendencies could actually be developed. Using the same apparatus, Jung (19) found that the movements of the arm or hand are stronger with affective than with indifferent forms of association. He also found that disturbances in the respiratory rate are connected with affective states, and confirmed this discovery with the aid of a galvanometer. Szymanski (42)

required his subjects to spend from one-fifth to one-half hour sitting in a chair so mounted that the movements of the occupant could be recorded on a kymograph. He instructed his subjects to refrain from changing their positions during this time, but found that the average interval of "immobility" was only 1.8 minutes, the range being 3.6 seconds to 5 minutes.

The importance of these studies lies in the attempt to establish a relationship between implicit behavior and so-called involuntary movements. The attempts have met with more success than is generally appreciated among psychologists. The indications were in favor of the assumption that the so-called sensory and affective processes, changes in attention, perception, thought, and even sleep, bear a definite, describable and measurable relation to involuntary motor movements.

*Recent studies in expressive movement.* The author (24) and others (2) have reviewed at some length various approaches to the study of emotional postures and movements growing out of affective adjustments of individuals. For this statement we shall therefore cull only studies which were published recently and which are especially relevant to our problem.

Luria (27) has carried out a number of experiments on motor responses, using stimuli to precipitate the excitations which existed in "concealed form" prior to the application of his stimuli. His method consisted in eliciting combined motor and verbal responses by giving the subject verbal stimuli, and recording verbal responses together with the coincident motor changes. Luria found that "The affect is each time a function of a dissimilar structure," and that the motor movements are merely an adjunct of the general picture of disorganization. A given motor disturbance, he found, does not always appear in a subject experiencing the affect, and, hence, "To include in parentheses all the movements observed during the affect is unconditionally incorrect." Having found no consistency between the motor responses obtained in his experiments, Luria has urged the study of the "neurodynamics" of affective processes in order to discover what varieties of dynamic structure may occasion various types of motor acts.



Enke (9) and Petrov (35) have taken the position that motor movements are not casual by-products of general affective disorganization, in Luria's sense. On the contrary, Enke found that there are types of movement that correlate with Kretschmer's known classification of personality types. Petrov has presented evidence to show that, in both children and adults, "extroverted emotional attitudes" seem to be coördinate with "broad gestures," and "introverted emotional attitudes" go hand in hand with "limited gestures."

The most exhaustive investigation, and the most systematic, along this line, was recently published by Allport and Vernon (2). These investigators have dealt with the problem of intra-individual consistency of motor movements "considered as dependent less upon external and temporary conditions than upon enduring qualities of personality." They used a battery of motor tests, including reading and counting, walking and strolling, estimation of known sizes, estimation of weights and handshake, tapping and compression of stylus, estimation of distances and angles, arranging Binet cubes, drawing figures, muscular tension, and ratings.

Allport (1) has suggested that "Before we can tell what gestures mean, we must know how habitual and characteristic the gestures are, and what habits of movement go together." He has therefore attempted to separate the habitual from the erratic movements of individuals, holding that the first are closely related to personality, as he interprets it, and the second are "relatively dissociated items of mood, interest, imagery, etc." Having found the reliabilities of tests given at a single session to average 0.75, and those of tests at different sessions to be 0.66, Allport and Vernon (2) concluded that "A subject expresses himself a second time in an identical performance with a considerable degree of uniformity," and that single habits of gesture are thus stable characteristics.

Thus Enke, Petrov, and Allport and Vernon have taken issue with the point of view represented by Luria that motor behavior is important when regarded in its totality but not as a series of specific movements. In doing so, they have established the fact

that there are habitual motor patterns which are subject to experimental study by certain types of instrumental and test techniques.

*Clinical observation of symbolic movement.* The non-instrumental approach to the study of expressive behavior began with the clinical studies of the late nineteenth century. It was not until Freud had taken account of a certain series of movement-facts which were apparently related to the adjustment of the organism as a whole that it began to yield notable results.

What attracted Freud's attention to certain movements which he briefly described in his *Psychopathology of Everyday Life* (11) was the fact (a) that they were striking and (b) that their effects were insignificant. Distinguishing between chance actions and acts erroneously carried out, Freud remarked that these movements "disdain the support of a conscious intention and really need no pretext." He found that these movements appeared independent and are accepted because "One does not credit them with any aim or purpose." Freud claimed to have collected some of these "chance actions" from himself and others, and suggested for them the term "symptomatic acts." However, Freud has never offered a systematic classification, or even a list, of symptomatic acts. He merely called attention to the fact that some motor movements are habitual, others regular under certain conditions, and still others evidently isolated functions of the organism.

Dealing with the problem broadly, Freud and his followers—Jung, Pfister, and Kempf especially—attempted to ascribe clinical significance to a few isolated gestures. Referring to thumb-sucking and nail-biting as infantile sexual gratifications, to spitting as an attempt to "purge oneself of sexual perverseness" (20), and to minor accidents, in their totality, as incomplete attempts at suicide,\* Freud and his students opened a vast field for psychological verification. Pfister (36) has connected symptomatic

\* See (11). For a number of these and other clinical generalizations of the Freudians there is now adequate laboratory proof. See, for instance, John McGeoch's work on memory, Ross Stagner's work on parental identification, Thomas French's and M. Krout's discussions on the relation of Pavlov's work to that of Freud. These studies do not necessarily imply that Freud's system, as a totality, has been borne out experimentally.



acts with the entire range of psychoneurotic manifestations; Kempf (20) has found application for them in the study of postures of psychotics and neurotics; and Jung (19) has made some use of unconscious movements in his study of complex formation and complex determination.

Thus we find a resolute change from the instrumental to the non-instrumental approach, a change whose value lies in the emphasis given to involuntary movements. Here they are not objects of study with the view to determining their relations to the implicit behavior of the individual. They are not, to be sure, studied with reference to personality types of individuals. But neither are they regarded as merely offshoot-manifestations whose value lies in their ability to be accurately measured. The problem that these non-instrumental studies raised was: What are they here for? What do they mean? And even though the observational studies of the psychoanalytic clinic did little to establish valid meanings, it does get credit for starting a movement in a direction little thought of before Freud.

*Time-sampling in the study of motor movement.* Before the observation of gestural behavior could lead to reliable results, non-instrumental observation itself had to be refined and specialized. The addition of time-sampling as a technique supplied a long-existing need. Dorothy Thomas and others (43, 44) have used observation techniques which were both reliable and valid. But the use of a technique which is especially adapted to the study of small samples of motor movement must be credited to Olson (30).

Olson (32) developed the time-sampling technique in connection with his study of the frequency of motor movements. He defined time-sampling as the "systematic recording of a definitely delimited unit of behavior, described in terms of action over a stated time-interval, yielding quantitative individual scores by means of repeated time units." More carefully defined, this technique includes the following features:

- "1. Observation by an eye witness.
2. Behavior to be observed defined in terms of overt action.
3. Behavior of an individual or a group observed for a stated time-unit, usually short.
4. A stated number of repetitions of the time-unit employed.

5. An individual score based upon the number of times in which the defined behavior occurs; or the total frequency of occurrence of the defined behavior in the total observational time; or the average frequency of defined behavior per unit of time" (32).

Olson's study (30) was based on the observation of tics in school children. His aim was to determine criteria of the genesis and incidence of these habits, and to develop differential tests and measures. On the side of origin, Olson found that irritational stimulation persisted in animals in the form of habitual movement. He thus concluded that children's tics are conditioned responses. He found that 29 per cent of the boys and 45 per cent of the girls studied showed the presence of tics under these conditions. The reliability of his measures was indicated by a coefficient of 0.86, and the validity by a coefficient of 0.77.

Using the time-sampling technique developed by Olson, and the entire range of tics as he had classified them, Koch (21) has attempted not only to gauge the frequency of motor movements in a group of pre-school children but also to obtain, by multiple factor analysis, intermeasure-correlations between (a) the "nervous habits" of the children and (b) age, skin-resistance patterns, blood pressure changes under emotional stimulation, tendencies to indulge in escape, attack, compliant and compromise reactions, personality-ratings, types of play or routine situation, etc. In most cases, chance or low measures were obtained, showing that no common factors exist between tics and the behavior-patterns isolated for study. Nevertheless, the four hundred short samples obtained indicated that tics represent individual differences stable over a considerable period of time. Thus the study confirmed the effectiveness of the time-sampling technique.

Neither Olson nor Koch apparently distinguished, as had Allport and Vernon, between occasional and habitual gestures. Neither of them analyzed the vast variety of possible responses which may be related to a given organ or set of organs. And both correlated their massive units, "nervous habits," with such other massive units as "imitation" (Olson), nutritional status (Olson), and personality-trait ratings (Koch).

*The present approach to the observation of gestures.* In the present study the aim is not to relate gestural behavior to the

entire range of implicit behavior processes. It is assumed that, when the organism acts, it acts as a whole, and that it is the business of the psychologist so to study it. It is not the aim here to develop new instrumental procedures, or indeed to utilize any of those already established. Neither is this a study of expressive movement in the sense in which the latter has been studied. That is to say, while it has turned out to be purely a matter of expressive behavior, the present study did not begin with any hypothesis to this effect. It is certainly not an instrumental study in the sense in which Luria's and the Allport-Vernon studies may be regarded as such.

It has not been the aim here to complicate the behavior of our subjects by means of restraint, thus rendering it, to that extent, artificial. This is not a clinical study in the psychoanalytic sense. The subjects have not been studied in orthodox Freudian fashion, and they were not, in many cases (certainly in the most important initial stages), aware of the fact that they were being observed.

While utilizing the time-sampling technique, this study goes considerably beyond the limitations of that technique taken alone. Indeed, an important departure from the time-sampling technique, as formulated by Olson, in this case, lay in the fact that no norms were sought as a result of our observations, and the principal aim was not to obtain scores of frequency, a task so well done by Olson himself in the study of the habitual type of gesture-movement.

The aim of this study was to develop, with care and proof as to reliability and validity, a method of approach to the study of certain types of explicit movement; to study these in typical life-like situations first, and under similar experimental conditions afterward; to emphasize controls in every case, using several types of controlled observation in certain instances; to avoid laborious restraint-mechanisms and unpredictable deviations from normal behavior-forms coincident to such mechanisms; and finally, to evolve a method of experimental and clinical procedure in the study of a generally neglected and until recently illegitimate field of psychological endeavor.



## CHAPTER TWO

### ASSOCIATION TECHNIQUES IN THE STUDY OF BEHAVIOR

*The meaning of word-association.* Our discussion of observation techniques has brought out the attempts of psychologists to study certain difficult phases of human behavior by well known instrumental and non-instrumental procedures. As a result, we can see why the observation technique chosen for this study was a modified type of time-sampling in which *controlled*, non-instrumental procedures were employed.

Now we come to another realm of experimental work, involving techniques which have been more used than commonly known, in the work of psychologists. It is by combining these techniques with those of controlled observation that we have succeeded in dealing with the elusive subject-matter here in question. In adapting the word-association techniques to our purposes, however, we had to improve on some of its shortcomings.

The first fault of the association technique, a fault owing to its history rather than its nature, is the vagueness with which it is generally defined. In some respects the term *association* is unfortunate. It inevitably reminds one of the associationism which, originating with David Hartley in the eighteenth century, continued to dominate European philosophy through the writings of the Scottish realists (Reid, Stewart, Brown, Hamilton), the Mills, and Bain in England; of Binet and Ribot, in France; and of others, elsewhere, throughout the nineteenth century. In the thinking of all these men, association was a process by which sensations and their "copies," ideas, defined as "primary states of consciousness," were somehow brought together.

Word-association, when it developed under the impact of Freudian theory, bore some resemblance, theoretically, to those theories of the eighteenth and nineteenth centuries. Both Freud and the Freudians generally have spoken of the association of *ideas* in the word-association technique which they have devel-



oped. As now seen, however, and as used in this work, the word-association test is an experimental effort to secure verbal (and motor) conditionings of human individuals. If it be said that verbal conditionings are always logical and clear, it may be countered that studies in cross-conditionings, made in the light of temporal relations between conditioned and unconditioned stimuli, leave considerable ground for the assumption that conditionings, as they are found to exist, are at times bizarre, fractional, and "illogical" (24). In the last analysis, then, all association is conditioning of movements, and it is movement-systems (verbal and non-verbal) that get interconnected, or disconnected, as the case may be. The word-association tests are a special variety of procedures, whose purpose it is to reveal those language-system movements which have become conditioned in previous relationships, and, whether conscious or not, present themselves under the press of time, and under the special conditions which the test requires.

Words are condensed equivalents of concrete situations to which they are conditioned, and so, as Jones (18) points out, "suddenly to ask a person to respond to a word denoting a given situation, marriage, death, etc., is, on a miniature scale, the same as suddenly asking him such questions as, 'What do you feel about this? How do you behave in this case?'" The reason that, in the association tests, one word is used by itself, instead of a whole phrase or sentence conditioned to a situation, is that a word imprisoned in a certain verbal context can not be shifted to various situations, to which it might apply, to find its concomitants, so to say. Alone, it may serve as a focus of varied and rich associations.

*Word-association as an experimental technique.* The first experimental study which employed an association technique was conducted by Galton in 1879. He used no subjects other than himself. Galton based his work on (a) the sound of the word rather than its meaning, (b) the "sense-imagery" or "ideas" aroused by the meaning of the word presented, and (c) the "histrionic associations which picture the performance of an action" (46).

Galton was followed by Wundt, whose disciple, Martin Trauscholdt, in 1883, published the earliest scheme of classifying types of association. Cattell continued the work in 1887, Cattell and Bryan in 1889, and Jung in 1905, establishing various types of associations on the basis of clinical work, devised a list of one hundred "standard" association words. Kraepelin, at about the same time, began publishing on the effect of practice and drugs on association time; and numerous other researches, by Aptekman, Pfenninger, Crane, Dunlap, Huber, the Casons, Crosland, Wells, Kent-Rosanoff, and Hull and his students, followed.

In 1910 Grace Kent and A. J. Rosanoff (38), on the basis of a study of 1,000 subjects, offered a table of normal and deviate word-association frequencies, with "values" attached to each word. Since Jung's list of words had proved, by clinical experience, to be heavily freighted with emotion, Kent and Rosanoff tried to develop their frequency list on the basis of words chosen for their relatively innocuous nature. Jung was interested in the affective nature of responses; Kent and Rosanoff in the individualization-socialization indices which their frequency list provided. For this reason Jung's list is not standardized as to frequency, and the Kent-Rosanoff list is not known for its value as a means to the study of emotional attitudes.

*Discrete word-association procedures.* The conditions under which word-association tests are given have been pretty much standardized.

1. The room is free from distractions, especially sounds.
2. The subject is comfortably seated, preferably with eyes closed.
3. The subject is prevented from looking at the experimenter's record.
4. The experimenter does not look the subject in the face.
5. A brief introductory statement is given, in which the subject is told that (a) he is to reply using one word; (b) he is to reply as quickly as he can; (c) he is not to repeat anything he hears; (d) he is to give the first word of which he thinks; (e) he is to reply regardless of whether he is sure that he has heard the stimulus-word or not.
6. Record of time elapsing between the giving of the stimulus and the receiving of the response is kept by means of a split-second stop watch, the hand preferably being permitted to run on in order to prevent uneven effects of the experimenter's own response in connection with the stimuli.
7. If a response-word is not understood by the examiner, the subject is asked to spell it; or else it is repeated in the end.

8. The experimenter records everything observed: response, reaction-time, questions, repetitions, all movements, and expression-changes.
9. A reproduction test follows the association test in one of two ways: either the stimulus-words are given again in the same or some other order; or else the subject's own response-words are given, and he is instructed to reproduce the original stimulus-words.
10. Standard, or special, or mixed, association-word lists may be given.

In its early stages, word-association was used to determine disorganization of the associative process by special emotional responses of individuals. Later the point of view arose that the disorganized associative process denotes a special emotional response evoked by the stimulus-word; in other words, that the stimulus-word may be used to tap an emotional attitude or a "complex."

Various 'complex'-determiners or 'complex'-indicators have been listed by investigators using association-techniques (Jung, Pfister, Hull and his students). Those most accepted today are the following:

1. Multiple response.
2. Personal (stilted, pompous, irrelevant) response.
3. Repetition of stimulus word.
4. Perseveration (repetition of previous response).
5. Superficial response (clang or rhyme associations, etc.).
6. Blocked response (vacuum).
7. Disturbance of reproduction.
8. Lengthened association reaction-time.
9. Short association reaction-time.
10. Delay in reproduction reaction-time.

The first five of these complex-indicators have reference to qualitative signs of emotional disturbance. The response is taken to be symbolic of the emotional difficulty lurking behind it. But the symbolic response does not always disclose emotionality; it may conceal it. When the response discloses the difficulty, the first five (1-5) indicators may be used for interpretation. When the response, however, attempts to conceal it, the remaining five (6-10) indicators apply instead.

It is when the complex is revealed in the association that it is hardest to diagnose. This is so because the indicators applicable to associated words in those cases are all qualitative in nature, whereas the indicators in the concealed-reaction type of response may be either qualitative or quantitative.



The qualitative diagnostic signs have been classified as follows:

1. Nouns eliciting adjectives or *vice versa* (sky-blue).
2. Verbs eliciting subjects or objects, or *vice versa* (to ride-horse).
3. Adverbs used as modifiers (cloud-ominous, safe-quite, etc.).
4. Proper nouns given in association (citizen-New York).
5. Stimuli taken as proper names (eagle-newspaper).
6. Pronominal response (hand-you).
7. Responses of *yes* or *no*.
8. Vague and scattered responses (whistle-nature; dream-behave) (18, 19, 48).

It is well to note that from 15 to 45 per cent of these, in a one-hundred-word record, may be regarded as normal (48), but all such associations are, of course, subject to further investigation, lest they prove to be important leads to aspects of emotional life which might be otherwise neglected. Of course, perseverated and superficial responses are relatively easy to diagnose, and require no special cautions, even though they are purely qualitative signs. This applies also to blocked responses and disturbed reproductions, which, though they indicate an effort to conceal, rather than a tendency to disclose, a complex, must be grouped with the qualitative indicators.

What is left to consider as unemotional or normal responses is coördinate nouns, expressing essential similarity between them (apple-pear), responses expressing some predicate-function, or attribute of the stimulus-word (snake-poisonous); or responses having a causal dependence on the stimulus (pain-tears). Words connected through frequent associations in daily use (cat-mouse), or identical words serving as definitions are also regarded as complex-free (18). Variations in attention, education, and age of subjects have been found to be significant, and, therefore, must be taken into consideration in the final analysis of results obtained (41).

The quantitative indicators revolve, of course, around the record of reaction-time (26). Jung was first in discovering that lengthened reaction-time is due primarily to the influence of emotion. Others (34) have confirmed this, and, in spite of apparent disagreement at the present time, it is obvious that reaction-time is probably the most reliable single index of emotionality. There are some differences, however, in regard to what should serve as a standard in the checking of reaction-time.

Some experimenters have adopted a more or less arbitrary reaction-time as a normal standard. Symonds (41), for example, states that any reaction that takes more than 2.6 seconds is usually significant; Jung (34) uses 1.8 seconds as a standard; Wells (48) uses 2.0 seconds. Those who, like Pfister, hold that in case of blockage, time should be permitted to run on, on the chance that the blockage may lead to important qualitative indications, favor a modal average. Those who, like Jung, limit their blocked response-time to 20 seconds, favor median reaction-time as a standard; and hold arithmetic means to be most revealing, because most reliable. The latter is also the author's position, although for reasons mentioned below, in the present experiments both median and mean reaction-times were obtained.

Freud, who originated the free-association technique as an aid in clinical practice, has stated that

"Free association is not really free. The patient remains under the influence of the analytic situation even though he is not directing his mental activities into a particular subject. We shall be justified in assuming that nothing will occur to him that has not some reference to that situation" (12, p. 255).

Such a statement would seem to imply that much of the emotionality displayed covertly or overtly by a subject derives from the subject's relation to the experimenter. In order to estimate the resistance to the experimenter, responsible for the emotion, Jung (19) has proposed that the formula

$$\frac{\text{mean reaction-time}}{\text{median reaction-time}}$$

be used to determine the index of what he has called the "psychic resistance" of the subject. This index ought to be included in the results of every word-association test in order to validate the entire procedure, and, especially, the reaction-time element.

Diversions, including incidental talking, translating response-words, espying objects, and various conversion phenomena, have been included in lists of complex-indicators. Thus, hesitation, stuttering, changes of position, secretion of tears, sighing, laughing, mistakes in speech, and other incidental responses of this kind have been referred to as being diagnostic signs (19). There is, however, no experimental basis, other than the present work,

for including most of the expressive movements listed. For this reason, as will later be brought out, all accessory movements, though recorded, were not relied upon in our experiments.

*Problems in free-chain association.* A word should be said about the objections generally voiced to the results of free-association tests. There are those who hold psychogalvanic phenomena superior in value to those obtained by association techniques (41). The objectors do not accept the galvanometer as superior because it provides the best available means of studying emotional behavior. There are various publications showing the psychogalvanic mechanism to be decidedly limited in value (50). And what is true of the galvanometer is equally true of other instrumental methods. One has to acquaint himself with the writings of Carney Landis (25) in order to appreciate the ineffectiveness of most instrumental approaches to this end.

A frequent objection is that there is need for special insight and skill on the part of the experimenter using word-association techniques (41). Discrete word-association, as shown in the preceding pages, has been fairly well standardized, and can be used with considerable exactness and common agreement at the present time. Even if it be true that, in the use of the continuous (free-chain) association-technique, considerable skill is required, it is not necessarily true that psychologists can not be trained in its use. There can be no objection to surgery because it requires a special kind of skill which only few (though many be taught) can actually acquire. Of course, the free-chain association method, as seen in psychoanalytic practice for example, may be likened to surgery and is admittedly of little use in the hands of the novice.

This leads to another objection, namely, that there is danger in using a test which relies so completely on words and conventional meanings as do the word-association techniques (29). There is no way of evading words in association tests, of course; and that is a difficulty, presumably, so long as we fear the wayward trend of verbal associations. This, however, has been due to the fact that we had not yet fully explored the trends of word-



association, and had not arrived at a theoretical statement relative to its origin and meaning.

Such an attempt has been made in this report. In order to validate the use of word-association we have devised what we have called the mute-association test, in which we have relied entirely on motor phenomena. Individuals in other cultures have relied on motor phenomena for signs of inhibited word-associations. An illustration may be borrowed from the court practices of India. When natives testify in Hindu courts, their faces are always calm and their feet generally bare. Hindu lawyers are, therefore, said to watch their witnesses' left toes. If the left toe moves, the witness is suspected of perjury. Expert poker players, in our own culture, when they do not rely on other methods, try to "read poker faces." This, of course, is hardly possible. What they are more likely to do is perceive the subtle changes in the motor movements of their opponents, assuming like those Hindu lawyers, that any change observed is a sign of inhibited behavior. Comparing the motor with the verbal behavior of their subjects, they infer that an inhibition is in evidence when the opponent's organism does not seem to act as a unity; and, hence, that the motor movement is a sign of unrevealed free association.

The tests employed here consisted essentially in the experimental production of motor-visceral changes by artificial inhibition of free associations to verbal stimuli. It has been known for years that an emotional tension (or "complex") may reproduce itself in a chain of word-associations, *i.e.*, that a group of motor-compulsions may determine the course of word-association. Comparatively recently we obtained experimental evidence for the fact that a chain of word-associations may be converted into a motor-storm or a chain of motor-disorganization symptoms (27). The mute-association tests, as given by us, were reproduction tests based on the theory that a "complex" series, evoked twice in immediate succession, will appear in the form of similar word-associations; and that, when the second chain of word-associations is inhibited, it will take the form of a motor series which is not merely symptomatic of, but deter-

mined by, those word-associations. Thus our mute-association procedure was designed to test at once the reality of the motor-storm occasioned by the inhibited verbal responses, and the possibility of correlating the motor-responses of one series with the motor-responses of another series initiated by similar causes.

*The use of word-association in this study.* Had we limited ourselves, in the use of word-association techniques, to the study of the parallelisms between word and gesture, we should have limited ourselves to the findings credited to Luria, viz., that a motor-storm is diagnostic of inhibited word-association. What we have done, however, involved the use of word-association in a more inclusive sense.

In the first place, we assumed that the word-association technique does call forth inhibited (or repressed) word-material, and that certain words (emotionally-charged words or complex-words) may be used to evoke other words, to which they are conditioned, and which may give us a sort of shorthand interpretation of some previous inhibitions. To test this we resorted to one of the most obvious uses of word-association, in a milieu in which word-symbols play such a tremendous rôle. This was to use the words *descriptive* of a large number of gestures as stimuli for association. Because of numerous other factors, such a procedure, though tried, did not seem very promising. It has, however, been of service negatively in establishing what, without this attempt, we might not have discovered.

In approaching our problem, we went on the assumption that, when gestures occur in a social situation, words may be supposed to have somehow precipitated them. In conversation, in a classroom situation, words were taken to be most significantly and most frequently connected with motor movements and other changes in organismic tensions. Our hypothesis, therefore, was that, by detecting the words occurring in a social situation which *immediately* preceded the occurrence of a given movement, we might have one of the most effective cues to the diagnosis not merely of the "affective storm" evidenced in the individual's behavior but also, and especially, of the factors that precipitated

the storm, and the original sources to which the factors themselves might be traced.

The anticipation of such results rested on the possibility of constructing, forthright, a list of stimulus-words which could be used in a word-association test, following the recognized procedures connected with the test. This, of course, required controlling. The test itself involves a control-provision in the form of reproduction. But our aim was to control the results still more carefully. Hence, we used various devices for "diluting" our gesture-word lists with words ostensibly unimportant to the subject. By varying these "dilution words" (called *non-crucials*, to compare with the others called *crucials*) we could check on the value of the original stimulus-words. By comparing the results obtained in the case of the subject with those obtained in the case of control subjects, we could get still further evidence of the accuracy of the tests employed.

In this study, then, we have tried to resurrect a still useful tool of experimental procedure which, employed with proper caution, leads into a field that would otherwise lie fallow beyond the pale of psychology. If we have not resorted to instrumental procedure—always to be used where profitable—we have at least uncovered new uses for a method which, had it not been for its history, would now be one of the most important in psychology.



## CHAPTER THREE

### AVAILABILITY OF GESTURES FOR EXPERIMENTAL PROCEDURE

In a paper read before the Illinois State Academy of Science in May, 1931, the writer (22) called attention to the fact that "There is a vast field of human activity, as yet little known or indeed even observed, which can be used constructively in personality study." Referring to this as a field of gesture-study, he pointed out that "Such gestures, for example, as clearing one's throat, forced coughing, and convulsive spitting—present where there seems to be no specific or understandable objective stimulation which would throw light on their appearance—challenge the attention of the student of human behavior." In later publications (23, 24) the writer described the problem at greater length, outlining the field of investigation and pointing out the difficulties involved in the study of this type of subject matter.

In the present study it is proposed to term the responses central to this problem *autistic gestures*, for, when the chief object of our behavior is "communication with ourselves," we may be said to behave autistically. Bleuler (14, pp. 45-47), who originated the term autistic thinking, speaks of it as a form of thinking in which the individual's attention is temporarily withdrawn from the external situation, thus making it necessary for the individual to express himself more fully in terms of internal stimulation. When an individual, inhibiting his direct response to an external situation, responds to subsequent internal stimulation *explicitly*, we have what we may call *autistic gestures*. Thus defined, they differ not only from the reflex movements of the infant and well-established conventional gestures, but even from the gestures of the child or the adult talking to himself. None of these is characterized by the sequence (a) extra-organic stimulation, (b) inhibited overt response to extra-organic situation, (c) intra-organic stimulation, and finally, (d) explicit response that is not

evidently directed to the extra-organic situation from which the original stimulation had derived.

*The range of experimental problems.* The present experiments were outlined and undertaken after a number of tests had been carried out by the writer on himself. In some of these he served as his own observer, and in others his students coöperated as observers, recording his gestures and other relevant information, while the writer was engaged in lecturing. Even though the results of these experiments are not included in this presentation, it may be assumed that they offered some hypotheses which the experiments that followed have in some ways proved and in some ways disproved.

Ten experiments are here reported. Some of these, presented in this chapter, were merely preliminary in nature. Others, described in detail later on, were somewhat more conclusive. The program of investigation, based on these experiments, was formulated as follows:

1. Can it be reasonably assumed that autistic gestures are non-conscious, and are not subject to interpretation, without special aid, by either the subject or a lay observer?
2. Are the effective stimuli of autistic gestures possible of determination through the study of (a) day-dream material, (b) conversational situations, and (c) reading responses?
3. Can we determine the specificity of autistic gestures in similar stimulus-situations? In other words, what is the consistency of autistic gestures?
4. To what extent are the stimuli of autistic gestures, when isolated, usable for the reproduction of the gestures?
5. To what extent is the reproduction of autistic gestures facilitated by hypnotic-trance conditions?
6. To what extent can the non-conscious origins of autistic gestures be determined by reliable techniques?
7. To what extent is the study of gestures an aid to the study of personality?

*Verbal responses to verbalized gestures.* The problem in the first experiment was to determine whether autistic gestures yield to conscious interpretation without special aid to the actor or

observer. The ultimate objective was to test the possibility of obtaining a list of verbal equivalents for the 160 gestures then collected by the writer. The experiment was conceived in terms of the word-association method as an approach to the discovery of conditioned verbal symbols.

One hundred and twenty college students participated as subjects. They were asked to take home a mimeographed list of gestures, and to perform the experiment in privacy. The list was not to be examined until the subjects were ready to use it. The subjects were instructed as follows:

1. Situate yourself in a quiet place, and, as you start reading the list of words, put opposite each stimulus-word the *first response word* that "comes to your mind." If unable to offer a word immediately, you are to wait until a word "comes"; but, after recording it, to put down the word, Delayed. If unable to get any kind of association, put down the word, Blocked.

2. After finishing the first experiment, you are to go over the list once more, this time visualizing (as clearly as you can) *another person* making the gestures while engaged in conversation. On doing so, you are to set down the *meaning* of the gesture made.

3. In the last experiment, you are to *perform* the gesture (so far as possible) yourself, and set down an interpretation of the gesture on the basis of your own behavior. When finished, comment briefly on these experiments.

When the data were tabulated, it became apparent that the responses in the third experiment were substantially the same as those in the second. Evidently, the postural responses of the subjects themselves, and the introjected postures of the subjects, reflecting the behavior of others, involved similar mechanisms, and thus yielded similar results. The results in the first two experiments indicated the modal values to be exactly the same in 109 (out of a total of 160) responses. In other words, in 75 per cent of the interpretations, the associations gave the same results as had appeared when the postural tensions or attitudes were employed as a check on the verbal associations. Here the indications were that postural sets tend to coincide with verbal responses to given sets of stimuli. The reasons for the overlap, though psychologically to be expected, may have been facilitated by the instructions given our subjects.

The question of statistically organizing over nineteen thousand discrete responses, which are not quantifiable, narrows down to



determining the modal value of the various stimulus-words, *i.e.*, listing the responses of greatest frequency. If the autistic gestures, in their verbal form, can evoke understandable responses, then, clearly, the responses that are most frequently given ought to be those of greatest significance. The list of modal interpretations of the 160 autistic gestures, organized on this basis, follows. The modal associations for both the first and the second experiments, and the corresponding frequencies, appear in Table 1.

An examination of the list of conventional interpretations will disclose a persistent tendency to trace each gesture-word to the organ with which the gesture is connected. The futility of this tendency needs no comment. Another tendency, which is apparent, is to emphasize certain words. The appearance of *nervous*, *itch*, *exercise*, *tired*, and *sleepy* is especially frequent, and indicates the meagerness of conventional concepts available for these gestures. Some of the associations revert to recalled observations. Illustrations are: *astonishment* for *gaping mouth*, or *cold* for *coughing*. Some associations are convenient rationalizations of obscure responses. Thus *adjusting glasses* brought the association *feel better on nose*; *grunting*, similarly, brought *animal*; and *chewing pencil* was associated to *thinking*. Many of the modal interpretations are clearly in the nature of what the analysts have called *reaction formations*, *viz.*, the opposite of what the individual might have said at a given point, and so completely unrevealing.

Responses that are symbolically related to the stimulus-words could be used by way of interpretation, but of these a careful study reveals only 12.5 per cent of the total. Illustrations of this type are: *back-stepping—dodging*; *biting lips—restrain one's self*; *bottling lips—concentrate*; *blowing through nostrils—stopped up*; *glancing at hands—dirty*. These associations, it must be remembered, are significant only symbolically. We might increase their number by choosing, from the total series, associations which appear to be suggestive of some familiar symbolism, but such a procedure would be obviously unreliable. Besides, it is doubtful whether we could, at best, find enough symbolic significations to cover the entire list.

TABLE 1

## A LIST OF MODAL INTERPRETATIONS OF 160 AUTISTIC GESTURES

Gestures	Modal Association, Experiment I	Frequency	Modal Association, Experiment II	Frequency
1. Adjusting glasses	Eyes	23	Feel better on nose	26
2. Air sucking	Pain	9	Remove object	10
3. Back slapping	Greeting	21	Greeting	30
4. Back stepping	Fear	48	Dodging	20
5. Belching	Indigestion	63	Bad stomach	60
6. Bending matches	Nothing else to do	26	Nervous	32
7. Bending toes upward	Exercise feet	20	Exercise	26
8. Biting lips	Nervousness	22	Restrain oneself	15
9. Blinking eyelids	Tired	10	Light	18
10. Blowing through lips	Wind	13	Cool	17
11. Blowing up cheek	Puff	12	Undecided	9
12. Blowing through nostrils	Congestion in breathing	20	Stopped up	19
13. Blowing nose	Cold	44	Clear nose	35
14. Bottling lips	Kissing	12	Concentrate	15
15. Breaking matches	Nervous	20	Nervous	25
16. Brushing hands	Cleansing hands	43	Cleaning	52
17. Brushing pencil	Nervous	23	Thinking	49
18. Chewing nails	Clean	37	Clean	41
19. Clearing throat—	To talk	26	Preparing to speak	43
20. Clenching fist	Anger	40	Angry	33
21. Clucking	Chicken	61	Imitating duck or chicken	14
22. Coughing	Cold	33	Cold	50
23. Cracking joints	Snapping	22	Nervous	11
24. Crossing legs	Knees	10	Comfort	46
25. Dragging foot movement	Cripple	25	Tired	27
26. Drawing nasal secretion into mouth	Vile	33	Clear nose	18
27. Displaying teeth	Smile	21	Proud of teeth	22
28. Drooping eyes	Sleep	26	Need of sleep	45
29. Dropping objects	Clumsy	29	Careless	16
30. Extending arm	Stretching	17	Greeting	24
31. Fidgeting	Nervous	62	Restless	37

32. Finger drumming	Thinking and Impatience	18	Nerves	20
33. Finger nose wiping	Vulgar	23	Forget handkerchief	27
34. Fixing hair	Comb	24	Habit	59
35. Flexing arm	Muscle	20	Stretching muscles	35
36. Flexing arm with finger	Egotism	23	Draw attention to oneself	34
37. Gaping mouth	Astonishment	44	Surprised	42
38. Giggling	Foolish	41	Amused	21
39. Glancing skyward	Aeroplane	23	Forecast weather	15
40. Glancing at hands	Dirty	21	Taking note of appearance	46
41. Grasping object	Hurry	22	Getting ready to leave	24
42. Grinding teeth	Anger	51	Angry	55
43. Grinning	Smile	23	Amused	23
44. Grunting	Animal	40	Dissatisfied	27
45. Hissing	Suck	21	Disapproval	30
46. "Hm"-ing	Song	21	Incredulous	17
47. Hiccoughing	Water	34	Sick	27
48. Humming	Sing	50	Happy	56
49. Inserting hand or finger into fist of other hand	Nervous and Orator	11	Emphasize	20
50. Jerking hands	Nerves	15	Nervous	28
51. Kicking foot movement	Playing football	23	Being irritated	21
52. Leaning against wall or object	Fatigue	36	Resting	26
53. Leaning on chair or table	Tired	19	Fatigue	24
54. Lifting skirt movement	Leg	16	Adjusting skirt	16
55. Lifting trousers	Sit down	13	Keeping crease in trousers	22
56. Making up	Cosmetics	30	Beautify	24
57. Making sucking or smacking sounds.	Good	24	Good	24
58. Manipulating genitals	Sex and Itchy	9	Being uncomfortable	9
59. Manipulating outside objects	Fidgety	13	Adjust objects	20
60. Manipulating personal objects (tie, etc.)	Appearance	27	Everything to be right	31
61. Massaging abdomen	In pain	37	Relieve pain	49
62. Moving ring up and down finger	Nervous	29	Nervousness	23
63. Munching	Food	29	Eating	19
64. Nodding head	Yes	63	Yes	89



TABLE 1—Continued

Gestures	Modal Association, Experiment I	Frequency	Modal Association, Experiment II	Frequency
65. Opening and closing objects	Nervous	32	Book	18
66. Passing gas	Stomach trouble	24	Sick	9
67. Patting abdomen	Satisfied and Good meal	15	Satisfied	26
68. Patting person, animal or object	Affection	15		
69. Pausing	Uncertain	25	Friendship	35
70. Picking ear	Dirty	26	Indecision	27
71. Picking nose	Dirt and Handkerchief	24	Remove dirt	44
72. Picking finger	Nails	11	Removing dried secretion	25
73. Placing non-edible objects in mouth	Baby	20	Nervous	30
74. Placing foot on supporting object	Rest	12	Thinking	28
75. Placing tongue in cheek	Bulge	53	Comfort	40
76. Plucking fingers	Nervous	9	Thinking	28
77. Plucking hair from nose	Pain	17	Nervousness	29
78. Plucking hair from brows	Tweezers	11	Appearance	21
79. Protracting lower jaw	Firm	21	Attractive	31
80. Protruding tongue	Childish	15	Determined	22
81. "Pss"-ing	Attention	16	Disrespect	33
82. Puckering lips	Kiss	19	Attract attention	72
83. Puffing	Run	60	Expecting a kiss	31
84. Pulling ear	Itch	24	Out of breath	20
85. Pulling down clothes	Undressing	8	Meditate	23
86. Punching paper	Hole	12	Adjusting	13
87. Pushing finger through button-hole	Nervousness	34	Nervous	11
88. Pushing ring off finger	Nervousness	19	Nervous	24
89. Raising eyebrows	Surprised	8	Nervousness	19
90. Regurgitating	Illness	32	Surprise	43
91. Retracting tongue	Withdraw	13	Stomach disorder	15
92. Rising on toes	Exercise	9	Dislodge food	10
93. Rocking	Chair	41	Exercise	44
94. Rolling up sleeves	Work	41	Rest	13
95. Rolling eyes	Flirting	56	Preparing	62
		64	Flirting	48

96. Rolling head	Exercise	26	Relieve neck	19
97. Rolling paper	Cigarette	20	Nothing else to do	14
98. Rotation of palm of hand	Itching palm	9	Exercise	12
99. Rubbing eyes	Tired or sleepy	87	Sleepy	60
100. Rubbing thighs	Sore	21	Sore	25
101. Scratching hands	Itch	75	Itch	65
102. Scratching fingers	Itch	66	Itching sensation	56
103. Scratching forehead	Thinking	53	Thinking	57
104. Scratching nose	Itch	52	Itch	6
105. Scratching head	Dandruff	21	Itch	22
106. Scratching teeth	Mad	24	Determined	37
107. Scratching legs	Itch	36	Itching	69
108. Shaking foot, knee, or toe	Sleep	16	Nervous	19
109. Shrugging shoulders	Don't know	34	Indifferent	41
110. Shuddering	Fear	53	Fear	42
111. Shutting lips with finger	Silence	47	Command silence	55
112. Sighing	Lovers	15	Relief	19
	Sad	15		
113. Sizing-up eye movement	Look	12	Appraise	46
114. Smiling	Happy	43	Happy	60
115. Smoothing clothes	Neat	44	Neatness	43
116. Snapping fingers	Don't care	15	Attract attention	19
117. Sneezing	Cold	51	Cold	45
118. Sniffing	Cold	31	Determine odor	38
119. Snoring	Sleep	64	Sleep	21
120. Spitting	Tuberculosis	21	Bad taste	26
121. Spitting with tip of tongue	Cheap	22	Something on tongue	30
122. Spreading fingers	Stretch	15	Relaxing fingers for comfort	11
123. Squatting	Exercise	25	Exercise	22
124. Squatting-rising movement	Exercise	38	Exercise	52
125. Squinting eyes	Poor eyesight	13	Bad eyes	9
126. Stomach growling	Hunger	29	Hungry	31
127. Stretching	Tired	38	Tired	33
128. Stroking beard, head and mustache	Thinking	41	Thought	56
129. Sucking fingers	Child	67	Habit	23
130. Sucking gums	Toothache	19	Need of cleaning care	13

TABLE 1—Continued

Gestures	Modal Association, Experiment I	Frequency	Modal Association, Experiment II	Frequency
131. Sucking lips	Lipstick	6	Moisten	13
132. Sucking tongue	Food	7	Pondering a decision	8
133. Stuttering	Excited	8	Speech impediment	12
	Nervous	8		
134. Supporting face with hands	Tired	21	Concentrate	28
135. Swallowing saliva (gulping)	Under strain	5	Scared	11
136. Swaying of buttocks	Showing off	9	Dancing	14
	Dancing	9		
137. Switching (turning) lips	Nervousness	11	Nervous	18
138. Tapping out rhythm of melody	Music	57	Keeping time	21
139. Tearing (crying)	Sadness	35	Sad	35
140. Tearing paper	Rip	16	Nervous	13
141. Tearing skin off fingers	Hurt	25	Nervous	22
142. Throwing chest forward	Proud	20	Breathing	27
143. Throwing-off coat motion	Fight	19	Cooler	22
144. Tickling	Laughing	55	Playful	29
145. Touching things	Inquisitive	27	Curiosity	26
146. Turning aside	Avoid	41	Avoiding	45
147. Twisting foot	Hurt ankle	63	Nervous	28
148. Twisting hair	Curl	55	Nervous	25
149. Twisting head	Look	26	Looking	15
150. Twitching mouth	Nervous	31	Nervousness	39
151. Wetting lips	Dry	45	Dryness	22
152. Wiping eyes	Crying	74	Remove tears	42
153. Wiping nose	Cold	34	Cold	46
154. Wiping lip border	Lipstick	19	Appearance	48
155. Wiping objects	Clean	30	Cleaning	52
156. Withdrawal of sacrum (sitting motion)	Weariness	10	Comfort	18
157. Whistling	Happy	31	Happy	54
158. Winking	Flirt	54	Attract attention	22
159. Wrinkling nose	Dislike	19	Disagreeable odor	13
160. Yawning	Sleepy	56	Sleepy	64
Totals		4,765		4,810



A further study of the associated responses disclosed a large number of what we have called individual, or egotic, responses, on the one hand, and a considerable number of blockages, indicating lack of overt excitatory response to a given stimulus word, on the other (Table 2). These response-types are similar in representing emotional tensions which the subject could not resolve at the moment. In the case of individual or egotic responses, the subject's postural shift is in the "wrong" direction. In the case of blockages, however, the subject is evidently unable to shift his posture from intra-organic stimulation altogether.

The individual responses took the form of names of persons, names of places, *yes* or *no* replies, and all types of odd remarks such as *oh, well*.

Some subjects attached riders explaining their associations. Of these the following might serve as illustrations:

My sister's friend often displays her teeth.  
Louis, a little boy I used to know, blinked his eyes.  
I immediately pictured my dad telling me how unladylike I was.  
Chang, mentioned several times in my paper is my dog, a chow.  
My sister used to scold me for doing just this.  
In school I often twist my head to see the clock.

On comparing the number of blockages and individual associations in the two experiments (Table 2), we find some interesting uniformities and contrasts. The results in the first experiment seem to show a high frequency of individual responses, while the associations in the second experiment are predominantly heavy on blockages. We also note the corollary fact that, in stimulus-words in which individual associations are found to be relatively high (in the first experiment), the blocked responses are found to be high (in the second experiment). Finally, wherever blockages, in connection with the first experiment, are found to be high, they are consistently high in the second experiment also.

These observations can be explained on similar grounds. When the verbal stimuli were directed to their own conditionings, the subjects could, in the presence of a conflict, reply in terms of any one of a number of co-conditioned movements; while, in project-

TABLE 2  
INDIVIDUAL (EGOCENTRIC) AND BLOCKED RESPONSES IN INTERPRETATION OF  
160 GESTURES

Gesture	Experiment I		Experiment II	
	Personal	Blocked	Personal	Blocked
1. Adjusting glasses . . . . .	15	3	2	12
2. Air-sucking (lip-corner movement) . . .	10	3	1	15
3. Back-slapping . . . . .	9	..	..	5
4. Back-stepping . . . . .	1	10	14	3
5. Belching . . . . .	19	3	1	11
6. Bending matches . . . . .	1	17	1	17
7. Bending toes upward . . . . .	19	3	1	9
8. Biting lips . . . . .	10	3	..	10
9. Blinking eyelids . . . . .	..	..	9	..
10. Blowing through lips . . . . .	1	3	1	11
11. Blowing up cheek . . . . .	14	4	2	15
12. Blowing through nostrils . . . . .	9	7	..	11
13. Blowing nose . . . . .	7	2	2	8
14. Bottling lips . . . . .	9	12	4	20
15. Breaking matches . . . . .	4	6	1	8
16. Brushing hands . . . . .	..	8	8	2
17. Chewing pencil . . . . .	4	3	4	5
18. Cleaning nails . . . . .	2	2	..	9
19. Clearing throat . . . . .	6	3	..	5
20. Clenching fist . . . . .	3	1	3	18
21. Clucking . . . . .	6	..	4	18
22. Coughing . . . . .	..	13	6	..
23. Cracking joints . . . . .	9	5	6	10
24. Crossing legs . . . . .	5	3	..	11
25. Dragging-foot movement . . . . .	3	1	2	12
26. Drawing nasal secretion into mouth . . .	6	5	4	18
27. Displaying teeth . . . . .	8	1	6	8
28. Drooping eyes . . . . .	4	..	..	8
29. Dropping objects . . . . .	2	2	..	14
30. Extending arm . . . . .	3	2	..	7
31. Fidgeting . . . . .	6	7	2	16
32. Finger-drumming . . . . .	..	9	4	2
33. Finger nose-wiping . . . . .	7	3	1	17
34. Fixing hair . . . . .	8	1	..	9
35. Flexing arm . . . . .	4	6	2	21
36. Flexing arm, with finger pointing to oneself . . . . .	22	8	5	23
37. Gaping mouth . . . . .	7	3	..	11
38. Giggling . . . . .	9	5	2	14
39. Glancing skyward . . . . .	2	2	2	8
40. Glancing at hands . . . . .	3	4	1	10
41. Grasping object (hat, pocketbook, etc.)	4	5	..	15
42. Grinding teeth . . . . .	8	1	3	8
43. Grinning . . . . .	12	2	9	2
44. Grunting . . . . .	12	3	11	..
45. Hissing . . . . .	8	3	..	..
46. "Hm"-ing . . . . .	14	6	1	12
47. Hiccoughing . . . . .	11	3	2	17
48. Humming . . . . .	4	3	1	9
49. Inserting hand or finger into fist of other hand . . . . .	8	9	5	15
50. Jerking hands . . . . .	4	10	4	10
51. Kicking foot-movement . . . . .	3	6	12	..
52. Leaning against wall or object . . . . .	4	2	3	11

TABLE 2—Continued

Gesture	Experiment I		Experiment II	
	Personal	Blocked	Personal	Blocked
53. Leaning on chair or table.....	..	13	4	5
54. Lifting-skirt movement .....	8	4	3	24
55. Lifting trousers .....	3	4	3	20
56. "Making-up" .....	4	5	5	12
57. Making sucking or smacking sounds..	5	4	2	10
58. Manipulating genitals .....	11	19	6	33
59. Manipulating outside objects.....	5	10	6	11
60. Manipulating personal objects (tie, etc.) .....	8	7	..	19
61. Massaging abdomen .....	7	2	3	8
62. Moving ring up and down finger.....	2	11	4	4
63. Munching .....	5	2	5	5
64. Nodding head .....	4	..	..	6
65. Opening and closing object.....	1	6	1	6
66. Passing gas .....	7	3	5	17
67. Patting abdomen .....	11	2	5	14
68. Patting person, animal, or object....	5	..	..	11
69. Pausing .....	4	8	4	8
70. Picking ear .....	6	4	..	8
71. Picking nose .....	7	1	2	15
72. Picking finger .....	5	3	..	13
73. Placing non-edible objects in mouth..	6	3	1	13
74. Placing foot on supporting object....	3	3	..	8
75. Placing tongue in cheek .....	8	6	1	13
76. Plucking fingers .....	5	7	3	20
77. Plucking hairs from nose .....	7	5	5	26
78. Plucking hairs from brows .....	7	2	3	15
79. Protracting lower jaw.....	10	3	2	15
80. Protruding tongue .....	10	2	3	12
81. "Pss"-ing .....	10	1	..	12
82. Puckering lips .....	2	4	1	20
83. Puffing .....	6	..	2	12
84. Pulling ear .....	8	4	1	17
85. "Pulling" down clothes.....	5	3	..	8
86. Punching paper .....	7	1	3	15
87. Pushing finger through buttonhole....	10	3	3	15
88. Pushing ring off finger.....	8	8	1	10
89. Raising eyebrows .....	18	3	5	8
90. Regurgitating .....	13	20	6	34
91. Retracting tongue .....	7	12	4	28
92. Rising (rhythmic) on toes.....	7	1	2	7
93. Rocking .....	7	..	2	11
94. Rolling up sleeves .....	5	1	1	5
95. Rolling eyes .....	8	3	8	13
96. Rolling head .....	4	..	..	..
97. Rolling paper .....	3	2	..	19
98. Rotation of hand or palm.....	9	12	2	21
99. Rubbing eyes .....	2	..	..	5
100. Rubbing thighs .....	4	4	6	2
101. Scratching hands .....	3	7	3	4
102. Scratching fingers .....	6	8	..	6
103. Scratching forehead .....	3	2	1	6
104. Scratching nose .....	4	7	..	10
105. Scratching legs .....	6	2	2	11
106. Scratching head .....	5	2	..	6
107. Setting teeth .....	3	4	1	10



TABLE 2—Continued

Gesture	Experiment I		Experiment II	
	Personal	Blocked	Personal	Blocked
108. Shaking foot, knee, or toe.....	1	8	1	10
109. Shrugging shoulders .....	6	1	..	7
110. Shuddering .....	6	1	2	7
111. Shutting lips with finger.....	3	4	..	..
112. Sighing .....	16	2	..	8
113. Sizing-up movement .....	11	5	..	17
114. Smiling .....	10	1	1	5
115. Smoothing clothes .....	4	3	..	8
116. Snapping fingers .....	10	5	..	10
117. Sneezing .....	8	2	4	10
118. Sniffing .....	9	2	..	12
119. Snoring .....	10	14	6	1
120. Spitting (convulsive).....	2	7	..	17
121. Spitting (with tip of tongue).....	6	..	..	5
122. Spreading fingers .....	4	8	..	19
123. Squatting .....	2	3	..	..
124. Squatting-rising movement .....	4	6	1	26
125. Squinting eye .....	8	5	..	..
126. Stomach growling .....	6	4	2	15
127. Stretching .....	6	4	..	10
128. Stroking beard, head, or mustache...	12	1	1	14
129. Sucking finger .....	4	1	4	17
130. Sucking gums .....	4	15	4	24
131. Sucking lips .....	6	21	..	20
132. Sucking tongue .....	9	24	4	30
133. Stuttering .....	20	4	2	10
134. Supporting face with hands.....	4	6	..	7
135. Swallowing saliva (gulping).....	4	3	2	13
136. Swaying of buttocks.....	6	11	6	24
137. Switching (turning) lips.....	8	20	4	25
138. Tapping out rhythm of melody.....	3	6	3	10
139. Tearing (crying).....	3	4	2	10
140. Tearing paper .....	..	5	5	4
141. Tearing skin off fingers .....	2	5	2	4
142. Throwing chest forward .....	10	6	1	10
143. Throwing-off coat motion.....	2	5	..	20
144. Tickling .....	7	4	7	16
145. Touching things .....	..	16	..	16
146. Turning aside .....	5	6	1	13
147. Twisting foot .....	11	8	1	15
148. Twisting hair .....	7	8	1	13
149. Twisting head .....	8	8	..	11
150. Twitching mouth .....	4	9	2	18
151. Wetting lips .....	3	3	..	12
152. Wiping eyes .....	5	1	..	10
153. Wiping nose .....	1	11	3	3
154. Wiping lip-border .....	4	11	4	19
155. Wiping objects .....	1	1	2	11
156. Withdrawal of sacrum (sitting motion).....	7	23	7	23
157. Whistling .....	4	3	..	7
158. Winking .....	7	..	1	10
159. Wrinkling nose .....	11	3	..	11
160. Yawning .....	4	..	1	5
Totals .....	1,004	816	369	1,858

ing their associations onto another individual, they could not digress similarly; and, for want of another type of verbal response, they inhibited all verbalization and thus evidenced a greater degree of conflict. It is expected, where a number of subjects find it impossible to associate normally to gesture-words, that they should find it equally difficult to interpret, or verbalize, their responses to images (or after-excitations) involving other individuals. If this generalization is tenable, then words which produced verbal inhibitions or blocked responses, in the first experiment, must have produced inhibitions in the second, more complex, experiment. Hence, the correspondence in the frequency of blockages in the two experiments.

The individual and the blocked responses thus tend to indicate first, the range, and second, the depth, of emotionality in gesture-words. In point of range it is evident that only about 10 per cent of the total number of associations were involved, so far as emotional reaction is concerned. But insofar as depth of emotionality is concerned, it is obvious that profound disturbance resulted from the administration of the stimulus-words in question. And this is probably all that could be expected from a preliminary test of this sort.

Another test, growing somewhat indirectly out of the experiment, consisted in requesting the subjects to comment on the nature of their findings. We may divide the comments into those which are, in the main, positive, and those which are largely negative. Following are a few illustrations of each type of comment.

#### SELECTED POSITIVE COMMENTS OF SUBJECTS

The test was very interesting to work with, but parts of it were vague and somewhat intricate. People do a number of funny things but I am convinced that every little movement has a meaning of its own.

This test was very surprising to me, as it asks very direct questions, and they are every-day, common occurrences among people. One could go through life without noticing any of the motions, yet people do them day after day.

My mind seemed to be continually striving to place the gestures in one of two physical causes or in one of two mental causes, the alleviation of some form of irritation or the relief of tired muscles, or embarrassment, uncomfortable mental strain, or being ill at ease, or bewilderment, or concentration.

## SELECTED NEGATIVE COMMENTS OF SUBJECTS

Sorry, but I've forgotten the last question which you wanted answered.

It's sorry that I am—that you did not get this other outline I had completed for Thursday. I suppose I lost it while soliciting Thursday.

— Sometimes two words came to my mind before I knew which I had thought of first; they seemed to conflict with the other. But putting myself in someone else's place and telling what his meaning for doing the act was irritated me at times when I couldn't think of a reason for his act. Some of the acts seemed very uncalled for.

I didn't have time to finish; forgot about it last night or would have completed it then.

Putting my reactions into words was the most difficult part of the experiment. Fatigue overcame me, and I found myself repeating the same answers for several questions, and I was confused by just what I should write.

I cannot coöperate in this experiment any farther. This experiment as far as I have gone, reacted upon me as an irritant. It has made me restless.

(I have finished only the first part of this experiment and I am already writing you my reaction.) I hate this whole thing. It makes me silly and seems absurd and ridiculous. It makes one self-conscious and also conscious about things which shouldn't even be thought about especially—I think. One can hardly be truthful—things are so mixed and disturbing;—After twenty or more questions like these one wonders whether he is thinking words, searching, making-up words or what. It is wierd—a test like this. It is also meaningless. I hope you do not consider me callow to put forth such an opinion, but I believe the less we think of things the better it is—even for psychology.—Do you take this seriously—this test stuff? I am interested to know if it can really mean anything. Without being thought “young” about it, I should like to say that it is to me merely “blah.” What for? Why?

From a study of these comments we can make several interesting inferences. Evidently there is a group, among these randomly selected commentators, who acknowledge the benefit derived from the experiment. These, of course, comment favorably, expressing their amazement over the discovery of so many irrelevant movements made by themselves and others. The second group, stating that they had wasted their time, had lost the word-list, had failed to follow instructions, or had developed various compensatory or regressive symptoms, showed considerable emotional disorganization.

In regard to the first group the case is clear. The gestures made by ourselves, and observed (retrospectively) in others, escape our notice. Hence, they must be largely non-conscious. In the comments of the second group, we find rejecting attitudes, indicating emotional conflict. From these the inference is pos-



sible that intimate complexes can be touched off in the process of free-associating to gesture-stimuli, and that gestures are thus probably charged with emotion. The conclusion that we reach is that gestures cannot be interpreted by conscious procedures, and that they are apparently difficult to approach by any technique because of the conflicts which they are likely to set off.

*Gestural responses to day-dream material.* The problem here was to determine whether the uncontrolled material of day-dreams could be used to interpret gestural responses. Six subjects participated in this experiment. All of them were college students with considerable background in psychology: one college graduate, five seniors, and one junior. The subjects were selected

TABLE 3

## THURSTONE RATINGS OF SUBJECTS IN PRELIMINARY EXPERIMENTS

Subject (fictitious initial)	Thurstone Rating	Interpretation of Rating (according to Thurstone)
1. <i>U</i>	100	Very poor emotional adjustment (in need of psychiatric advice)
2. <i>V</i>	75	Emotionally maladjusted
3. <i>W</i>	72	Emotionally maladjusted
4. <i>X</i>	39	Average adjustment
5. <i>Y</i>	31	Average adjustment
6. <i>Z</i>	12	Extremely well adjusted

on the basis of intelligence, scholarship, interest in the experiment, and availability as former students of the experimenter.

In view of the difficulty of obtaining concentration in many individuals, in experiments involving autistic gestures, it was thought advisable to use an emotional-adjustment schedule, in order to determine whether there is a standard, measurable quality of adjustment that could be used in selecting subjects most favorable to the demands of the experiment. The Thurstone personality schedule was employed for this purpose, with the result shown in Table 3.

After discussing the nature of the experiment with the subjects, and pointing out some of the expectations involved, the experimenter gave the subjects the following instructions:

Relax and gradually pass into a state of abstraction (uncontrolled association). When comfortable, begin to day-dream. As soon as some gesture occurs, stop and immediately set it down on paper, along with the "image" preceding

it, if available. Thereupon, use the image recorded as your stimulus-word to obtain a chain of free associations. Finally, attempt to explain (a) the appearance of the gesture at the point at which it appeared, and (b) why the automatic response took the particular form (of the gesture) which it took. Prepare a detailed report of your findings.

*W* failed to get results by this method. His report contained a note which read as follows:

"Day-dreaming unsuccessful. I was laboring under difficulties. I would fall into a state of 'nirvana.' To be exact, into an indifferent mood—which brought no dreams and no thoughts. I tried lying down, but then erotic thoughts of such frightful dimensions took hold of me that I gave up the experiment. Later I tried again. But the same thing happened. It is almost impossible for me to bring on day-dreaming, although as a rule I am quite a natural day-dreamer. I was in some way conscious of a feeling of worry because I was not able to do something for you and for the project."

This brought out one type of difficulty which the subjects encountered, but which was not essentially connected with the experiment.

*V*'s reaction was similar. His report also contained a letter. It read:

"I just got through with an attempt at day-dreaming. But it was quite different from what I call day-dreaming. My mental experience tends to become confusing, and I become unduly conscious of my arms, legs, in fact my whole body. Perhaps, in a nutshell, I can say that I can't seem to integrate my technique. This association business for example: I'm sorry, but I'm having trouble with it. In the half hour there was nothing significant until I got disgusted. Then I wrote: 'I give up.' Then I threw the pencil down on the table, sighed, and stretched. As in other dream-periods, I had yawned. A couple of times I chuckled at my attempts. God grant that I keep a sense of humor!"

His paper was a disconnected account of fragments of day-dreams. There was no attempt at interpretation.

*X* produced a good deal of material carefully arranged. This subject was able to connect each gesture to a definite occurrence of the same day or of the day before. His interpretations, superficial as they are for that reason, give indication of dependence of gesture on general response-tendencies (or attitudes) prevailing in an individual at a given time. Illustration:

1. *Stimulus*: Dr. M.—*Gesture*: Pain in lower jaw. . . . Sigh—*Free Ass'n*: Be rough, polish—*Interpretation*: Medical ambition; Dr. M. attempts to persuade me to go into dentistry.

2. *Stimulus*: School graduation—*Gesture*: Itch in R. arm—*Free Ass'n*: Friends, old, gone, forgotten, inside, value—*Interpretation*: Wish for old friends' reunion.

It will be observed that, even though the connection with the event is made in the case of every gesture, this subject does not attempt to meet the requirement that he explain how a certain gesture came to be connected with a certain situation.

Z offered a record very much like X's. The arrangement is logical and definite, but a good many interpretations are merely conventional. This student was interested in politics, and a good deal of his time was devoted to the interests of a political "boss." Illustrations follow:

1. *Stimulus*: What? Shall I become a boss' son-in-law?—*Gesture*: Swallowing saliva—*Free Ass'n*: What would mother say?—*Interpretation*: Dislike for the idea.

This is probably neither correct as to explanation nor revealing as to the source of the gesture. In some cases the analysis is adequate, though superficial.

2. *Stimulus*: She is pretty. . . . An Autumn romance I must have—*Gesture*: Puckering lips—*Free Ass'n*: No ass'n—*Interpretation*: To kiss.

U localized the gestures, traced them to their antecedents, and made an attempt to interpret them in terms of immediate associations. He was successful in most instances. His style combines the descriptive (rather than systematic) approach of V with the analytical attack of X. Illustration:

1. As soon as I put pen and paper away, I rubbed my forehead a few times trying to forget the scene above—to rub it out of my mind—and begin a new dream.

2. Dreaming of a fellow asking me to do him a favor, giving him a speech of mine to use. I have no high regard for this fellow; in fact, I consider him a four-flusher. While dreaming I was feeling with my left hand on the couch upon which I was lying, and found a small crumb. I squeezed it with my fingers for a while and threw it away. . . . I interpreted my squeezing the crumb as signifying my unwillingness to grant him this favor, but finally threw the crumb away: finally giving him what he wanted, throwing it at him, sort of throwing a dog a bone.

Y, because of his greater maturity and his graduate standing in psychology, proved to be the best subject. His record is not only the completest but the most revealing. The report is a continuous descriptive affair of the U type, except that the interpretations offered are more adequate.

1. Scratch with thumb at left side of abdomen—Use of thumb in this case makes me suspect that what I am doing is giving myself a dig in the side.



2. Draw thumb horizontally across forehead in a wavy line—I make myself another wrinkle on the forehead.

3. Before I found last interpretation I run fingers upward vertically over forehead—I wipe the wrinkle away now. Suggestion is that the wrinkle was a self-made, fictitious one. Now it has been abolished(?).

The full implications of this experiment will be discussed together with the findings in the next two experiments.

It appears from these data that, in spite of the difficulty of inhibiting the flow of associations long enough to discern and record a gesture; of retrospectively accurately enough to discover the probable word-stimulus; and the further difficulty of free-associating to sources of stimulation which are obviously repressed (or they would not occur in a day-dream), it is possible, in some cases, to secure interpretive material by this method.

*Gestural responses in conversational situations.* The problem in this experiment was to test the hypothesis that the effective stimuli of gestures can be determined through the study of conversational situations.

The conditions were the same as in the preceding experiment. The same subjects participated, except Y, who lacked time for this experiment. The instructions were as follows:

You are to engage another subject (or an outsider) in conversation, after reclining in a soft chair and recording occasional gestures as in the previous experiment. Conversation is to be carried on in as casual a way as possible. When an irrelevant movement occurs, immediate note is to be taken of the words just preceding or just following it (overtly or subvocally). At the close of the sitting, free-association is to be employed, and interpretations attempted.

V enclosed a statement explaining that the original notes he had taken contained some drawings which he could not transfer. He reported a good deal of conversation, noted a number of gestures, but did not interpret them. He used question marks repeatedly instead of giving free-associated material.

W sent a note also. It read:

"You will notice that there is hardly any association in my experiments. This is due to the fact that I followed too strictly your instructions as to the method of procedure. . . . I would be able to do more fruitful work were I able to rid myself of the idea that the gestures in the given situations are wholly and totally due to physiological disturbances, and have nothing to do with any psychological phenomena."

This note, coming after that indicating a panicky condition on an erotic basis, is probably a rationalization. At any rate, here again no profit is derived, since interpretation is not attempted. Associations are given, but they are highly individual in nature.

U performed substantially as before, making special note of the fact that he eliminated "a few gestures that I considered rather conventional and of no special significance." Most interpretations rationalize the underlying meaning. Illustration:

*Stimulus*: "Every Greek and Nature weren't one;" *Gesture*: Wet lips and swallowed; *Association*: Greek, thinker, philosophers, false, minority. *Interpretation*: Swallowing and wetting lips—at what I thought to be a false rendering of facts—eagerness or desire to prove my contention.

There is no evident relation between the interpretation and the gesture involved.

Z recorded his own words, the gesture following, the words of his conversationist, and his "analysis" of the gesture. The conversation reported was with a young lady of whom the subject was fond. The analysis was garbled, and revealed no insight into meanings. Also, no distinction was made between conventional gestures, such as "pressing hand against heart," and the autistic gestures studied.

X repeated the performance of the preceding experiment. He located with precision the conflicts or crises in previous responses, which gave meaning to gestures, but did not explain the specific reference of the gestures.

Illustrations of some rather obvious interpretations that could have been made are these:

1. *Stimulus*: Little of jealousy; *Gesture*: Rubbed eye; *Ass'n*: bad, good, awful, horrible, abhor; *Interpretation*: Hurt at idea of jealousy.

2. *Stimulus*: 65½ inches tall; *Gesture*: Scratched top of forehead, and, immediately after, in genital region; *Ass'n*: Short, shrimp, play football, run, faster; *Interpretation*: Misgivings regarding short stature.

Here again we find the subjects handicapped by (a) irrelevant motor-movements in the form of writing, which supplanted gestures or made stimuli more difficult to locate; (b) emotional storm and rationalizations offered; (c) emotional tensions existing between lovers, and lack of critical insight due to the nature of the conversationist; and, finally, (d) inability to deal force-

fully with repressed unconscious material, as in the case of *U* and *X*.

*Gestural responses to visual stimuli.* The attempt made in this experiment consisted in determining whether or not gestural stimuli can be discovered through the isolation of gestures made while reading. The conditions were the same as in the preceding experiments. The same subjects (except *V*) coöperated in this experiment.

The following instructions were given the subjects:

Go off into a quiet place and begin to read (pamphlet furnished to all subjects, to provide similar source of stimulation). As you do so, watch yourself for any gestures that may occur. As you make a gesture, immediately stop and record it, together with the word or phrase in the text or in your mind to which you paid attention just before making the movement. See if there is any relation between them.

Again *W* sends an apology.

"From the moment I began reading I was so conscious of the experiment that I could not help but inhibit innumerable gestures. I felt so tense, drawn, and set throughout the reading that my muscles in the neck stiffened, my lips were tightly drawn together, and my cheekbones began to stiffen. I was aware constantly of an itching sensation around the corners of my lips. I can truthfully say that, try as I did to read carefully, I did not succeed except at looking at mere words or letters. I may add that I was very conscious of this fact, which added greatly to my worry. While in general I inhibited, in a few instances I actually tried to bring gestures consciously. The following that I do cite here I am inclined to attribute to some physiological disturbance, as fatigue or uncomfortable position at the moment."

An illustration should prove interesting:

*Stimulus:* Unlike the preceding type of lying, it may emanate from the projection. *Gesture:* Itching of foot, followed by immediate movement of the same (right) leg. *Interpretation:* Am quite sure that this was absolutely due to fatigue of foot.

In view of the panic previously recorded, of the obvious resistance of this subject to the experiment or experimenter (as a sort of defense against the panic), and the symbolism implied in the second phrase quoted, the rationalization based on "physiological causation" appears entirely understandable.

*U* also reports a "very strained condition." He says that he was "aware of his task at all times and couldn't get himself to feel at ease." He further says that he inhibited many gestures, thought some of them irrelevant, and ascribed the rest to fatigue



and "natural causes." He stressed the "habitual nature" of some responses, such as wetting lips, for example. In some cases he comments that the gestures occurred because he had been trying hard to inhibit others. The results were as incomplete as in *W*'s case. The subject was therefore asked to repeat the experiment. He did so, and the results were more favorable. Not only did he trace each gesture to the visual stimuli concerned, but he even arrived at certain generalizations to which he adhered consistently throughout the record. An illustration of this is his interpretation of the swallowing gesture as implying "desire for something," desire to have, to know, etc.

*X* confirmed *U*'s finding with regard to swallowing, and offered a number of other interpretations more relevant than any offered before, though hardly clear to the subject himself.

*Z* did an unusually thorough piece of work in this experiment. Though in a few instances he dismissed his gestures with the remark that they signified pain, fatigue, or "need for air in the nose," yet he succeeded in offering several acute interpretations also.

#### Illustrations:

*Stimulus:* We expect an effort . . . to elect candidate . . . against the party of the president in office. *Gesture:* Kicking foot movement. *Ass'n:* Anybody but Hoover; it won't even be an effort because whoever will run will get elected. *Interpretation:* Kick Hoover out.

Of course, even here the deepest type of insight is lacking, for Hoover in this case may not refer to the president but to some substitute identified with such a functionary. Yet the interpretation of the movement, regardless of reference, is probably accurate.

*Y* succeeds in about half of all the gestures observed. Some of his interpretations clearly indicate the deeper possibilities of free-association applied to gestural phenomena.

*Stimulus:* Incident referring to Darwin who, as a youngster, stole some fruit from his father's orchard in order to attract attention to himself. *Gesture:* Scratch abdomen just above genitals. *Interpretation:* "Hidden fruit" (referring to the phrase in the figurative sense).

It became obvious, after the last three preliminary experiments had been recorded and analyzed, that there were certain possibili-

ties in the investigation of autistic gestures. What seemed clear from the outset was that emotionally maladjusted individuals would find it difficult to go through experiments of this type and achieve anything of value to themselves or helpful to our knowledge of autistic gestures. We, therefore, ranked the subjects according to achievement (*i.e.*, in the order in which the data had been presented), in the three experiments, obtaining the results listed in Table 4.

This table shows that the emotionally maladjusted subjects, as diagnosed by the Thurstone schedule, did most poorly on these

TABLE 4  
COMPARATIVE RANKING OF SUBJECTS ON THE BASIS OF ACHIEVEMENT IN  
PRELIMINARY EXPERIMENTS

Subject	Exp. I	Exp. II	Exp. III	Total
<i>U</i>	5	3	2	10
<i>V</i>	2	1	0	3
<i>W</i>	1	2	1	4
<i>X</i>	3	5	3	11
<i>Y</i>	6	0	5	11
<i>Z</i>	4	4	4	12

tests, and that the well adjusted and extremely well adjusted individuals did best. We note also that the subject diagnosed as "in need of psychiatric advice" did almost as well as the last three subjects. This is somewhat unreliable as an indication, however, since we used one subject only, and since, too, he was asked to repeat some of his experiments, whereas the others were not.

The chief purpose of these preliminary experiments was not, however, to adduce evidence in favor of or against the usefulness of certain personality types, or to answer questions relative to the more fundamental problems involved in this study. These experiments have achieved their purpose by, first, pointing to the probability that autistic gestures can, with proper techniques and fairly well adjusted subjects, be approached experimentally; and, second, by showing that stimuli related to autistic gestures can be assumed to exist in the immediate situation in which the gestures make their appearance.

From these experiments we passed to a more elaborate attack

on the topic. Assuming that what a subject could determine by retrospection, an observer could accomplish by a carefully ordered sampling technique, we proceeded to gather autistic gestures from individuals who had volunteered as subjects but had neither suspected that they were being observed nor understood the nature of the total experiment. Thus these subjects differed from those in the preliminary studies, in that the latter shared in the hypothesis underlying the experiments and were thoroughly aware of the fact that they were being observed, even if only by themselves. In spite of these differences, the new subjects were chosen with a certain amount of regard for the diagnostic value of the Thurstone schedule.



## CHAPTER FOUR

### DETERMINATION OF RELIABILITY OF GESTURE-OBSERVATIONS

When precision instruments are used in a scientific investigation, they need be only casually referred to in order to be accepted with all their advantages and limitations. In cases like the present, where human observers are employed, no such reference is possible; and the investigator is under obligation to justify his procedure not only by describing in detail the techniques employed but determining with certainty the reliability of his observers. Not that precision instruments are necessarily always precise. The possibility of misapplying so definite an instrument as the X-ray machine is well known. Depending on the angle of approach, the nature of the material, and the type of diagnosis sought, the X-ray may be employed with varying degrees of accuracy. If this is true of precision instruments, it is eminently true of human individuals acting as observers.

We shall therefore proceed to establish, first, what types of procedure were employed; second, what was the nature of our subject-material, as determined by tests; third, what weaknesses and pitfalls inhered in the procedures used; and fourth, and most important, how reliable were our human tools, namely the observers, as measured, through their performances, by correlation coefficients. Of course, a correlation coefficient expresses a general trend in a given series. It always requires interpretation, and it often makes an analysis of data necessary, in addition. With these qualifications, we shall attempt to correlate the data obtained by the procedures used in this investigation.

*Experimental procedures.* Our problem was to determine the specificity of gestural responses, *i.e.*, to seek an answer to the question: How consistent are autistic gestures under relatively similar stimulus-conditions?

The work was carried out in four introductory psychology classes in the fall semester of 1931. Subjects and observers were

selected from the total number of volunteers. Observations were made while classes were in session. Two observers were assigned to each subject, and a total of sixteen subjects coöperated in the experiment.

Thurstone emotional-adjustment scores and Otis I.Qs. were obtained for all subjects. The subjects were unaware of the nature of the experiment for which they had volunteered, until the experiment was over. The observers were instructed not to arouse the subjects' suspicion.

The observers were trained in observation. Accuracy in time-recording was assured by setting the second-hands of co-observers' watches to correspond, or by correcting for the differences immediately after observation. Records were compared at the end of each hour's observation to get comparable terminology. As much of the stimulus-situation as possible was recorded. The gestures were also described as accurately as possible.

The gestures recorded in the classroom were numbered as recorded. The observers made their entries every ten minutes, on the minute, but not until they had signaled to each other to make certain that they started at the same time. The observers were situated back, and to the left and right, of the subject, respectively.

The classroom records were compared, and a limited but varying number of classroom gestures was selected for the experiment. The gestures were selected on the basis of agreement in regard to description, exact time of occurrence, and stimulus-words or phrases presumably effective in eliciting the gestures. These stimulus-words and the previous gestures, henceforth called *classroom gestures*, were placed on separate sheets which were handed to two observers, henceforth called *observer A* and *observer B*. Added to the stimulus-words, in irregular order, were an equal number of control-words selected from the Kent-Rosanoff word-association list.

After five days' observation in the classroom the subjects were asked to report for another experiment. At this time they were seated at desks comparable to those in the classroom, facing a blank wall. They were provided with their (own) usual class-

room equipment—textbook, notebook, and pencil or pen or both. Before the experiment began, the subjects were engaged in pleasant conversation and permitted to relax.

The procedure consisted, first, in administering a discrete association-test. The observers recorded the responses, using a Jacquet split-second watch. Following the discrete association-test, the observers gave the subjects a discrete word-reproduction test. Then a free-chain association-test was given, in which the same list of words was used.

The mute-association test, given next, was thus preceded by a free-chain association-test. The technique consisted in recording the subject's motor responses which occurred when they inhibited the previously given word-associations to the same stimulus-words. The subjects were instructed again to free-associate, without, however, uttering words.

The observers recorded the gestures that occurred in the mute-association test in response to the specific, or crucial (classroom) words, as well as those in response to the control, or non-crucial words. The observations recorded were called *1A* and *1B*, to distinguish them from the observations obtained in the next procedure employed. In the latter, the crucial words alone were given, and the records for the two respective observers were called mute associations *2A* and *2B*. The same observers participated in both tests; *1A* and *2A*, *1B* and *2B* being, respectively, the same individual.

A half hour's interval was allowed between the discrete and the free-chain tests, and fifteen minutes elapsed between the two mute-association tests. The average amount of time devoted to the entire test-series was about four hours.

The stimulus-words in the mute tests were given at intervals of one minute. A pencil was softly tapped at the end of a minute, to indicate a change in stimulus-words, to permit a switching of postures, and to facilitate a new flow of gestures. If a frozen gesture or posture seemed to continue when the pencil was tapped, the observers waited for the cessation of the posture. Since the subjects were previously instructed to compose themselves when



they heard the tap, the overflow gestures, which occurred immediately after the tap, were recorded but kept apart from the normal entries.

A small number of the subjects did not complete all the tests, and their data were, therefore, used only to the extent to which they were available.

*General characteristics of subjects.* Since the I.Qs. of the subjects were available at the college office for all but one of the subjects, these were used as recorded. The mean I.Q. for the group, as measured by the Otis S.A. test, was 109. The mean for the entire college, based on a study of 3,500 students per year, for two years, was 105.5.

The average Thurstone emotional-adjustment score for this group was 46, the range being 23-80. This series compared favorably with the range of 13-134 obtained for four classes of about 125 students the same semester. It is also worth noting that, according to Thurstone's own scale, those chosen as subjects belonged, on the average, neither in class D, or those emotionally maladjusted, nor in class E, *i.e.*, those in need of psychiatric advice.

An analysis of the Thurstone blanks of the subjects indicated that they were *all* deficient on the question relating to trusting people, their answer being uniformly in the negative. On the questions relating to frequent day dreams, all of them responded affirmatively; also, to worries over low marks. Between 65 and 75 per cent responded, "wrongly," to the questions relative to "ideas preventing them from going to sleep," ascendance-submission relations, regrets over hasty statement, the desire to run away from home (at one time or another), having "queer feelings" occasionally, feeling "just miserable" at times, hesitating to volunteer in class recitations, and loving mother more than father. These indeed may have been some of the factors explaining how these volunteers were obtained, but the writer could not, for that reason, incline to the view that they were a specially selected group, and that their gestures were different or over-determined because of these characteristics. It is worth noting

that these were only a small number of the 222 questions in the Thurstone schedule, and that the answers to the other questions well approximated a normal distribution.

The purpose of the experiment was thus accomplished in selecting as subjects only such individuals as fell within the limits of normality for both intelligence and general emotional adjustment, insofar as the tests employed revealed intelligence and emotionality.

*Difficulties in classroom observation.* Several difficulties were inherently a part of the observation process. These difficulties were, on the whole, not peculiar to the problem before us. Rather, they may be regarded as difficulties with which psychologists have to cope whenever they employ the time-sampling technique. A small number of these may be said to have been due directly to the nature of our set-up.

Distractions due to classroom procedure undoubtedly affected the efficiency of the observers. Complete concentration under conditions of shifting emphasis and unexpected change in stimulus-situation is difficult; and it would be unreasonable to assume that the observers, unlike the subjects, failed to respond to the substance of the lecture or the comments of the classmates occurring at the time of observation.

The observer's absorption in a given gesture, also, often forced him to lose track of the antecedents which were of great importance in the experiments before us at the time. As a result, there were a good many gestures "lost" to us; and, in some cases, presumably, the supposed stimulus-phrase was paraphrased and, thus, inaccurately recorded.

The effect of the verbal stimuli on the observers influenced both the selection of gestures and the recording of stimuli. Functional aphonia, as a symptom of emotional difficulty, is not uncommon. We all have to stop occasionally to "listen again," or else to have a statement repeated. This failure to perceive certain auditory stimuli may have been present also in the case of visual stimuli. The "blind spots" of every individual limit the range of his behavior, at least in an explicit sense. One of

the observers, for instance, repeatedly omitted the word "kissing." Others undoubtedly were remiss in other respects.

This brings us directly to another difficulty, namely, that of observing explicit behavior generally. Thus, swallowing, tongue-movements, not to mention others even more obscure from the observer's standpoint, may serve as illustrations.

Gestures made by the observers themselves are not the least of the factors to be considered; for the observers unquestionably "took time out" to gesture in their own right. Intra-organic stimulation occurring within the observers, necessitated adjustments which received expression in squirming, rising, etc. It would be futile to assume that any observer could restrain his movements for more than the limits that Szymanski found his subjects capable of restraining themselves, *when instructed to do so* (42).

The serial nature of the gestures presented another difficulty. One cannot record, at a given time, the changes which take place simultaneously at different points of an acting organism. To do so would be to possess the eye of a photographic camera, and even a camera emphasizes one point of view as against another. Consequently, there are often differences in the order of recording the gesture-sequence, and also omissions and inclusions, which can be understood only on this basis. Observers choose for "specialization" some few favorite regions which they study more carefully than others. Some choose the face, some the legs, others the torso or the hands. Such specialization, in turn, is due to the types of gesture-movements which the observer himself has been habitually employing. Our preliminary experiments would indicate that one who had been habituated to shoulder or arm movements to a greater extent than to other movements should watch out for just such movements in others.

Finally, personal bias of the observer toward his subject is an inescapable difficulty in any case. Most often this is not conscious, since, when we identify a given person with another, we displace our affections or animosity in his direction, quite without his having anything to do with it. In some cases, in our own



work, these animosities and likings were fairly well recognized by the observers, who were frank in admitting them. Such determinable attitudes accounted in certain cases for a marked diminution of recordings; and in others led to profuse but highly "specialized" lists of recorded gestures.

It is admitted that, had the experimenter preferred to have kymographic readings, photographic records, and such like, he might have avoided some of the difficulties mentioned. Free observation (of which time-sampling is one variety) admittedly involves the problem of double-variability: variability on the part of an observer and variability on the part of a subject observed. It is to be remembered, of course, that some of them would persist with any type of approach. On the other hand, free observation in uncontrolled situations has so many advantages which controlled experimentation does not possess that it is not to be regretted that, in spite of their shortcomings, these experiments have been conducted as they have.

Depending entirely on the corresponding entries of observers is, however, one way of guarding against pitfalls. Insofar as reliability of observation means anything, it means the degree to which the variability of observers has been eliminated. At Yale, in the observation of physical contacts and languages in motion pictures, after long-extended training of observers, the percentage agreement obtained was as high as 91-96 for language and 75-83 for physical contacts (3). Olson found the correlations between the records of two observers to vary from 0.20 to 0.78. The reliability coefficient (for five observations) was found to be 0.67 with 0.80 as the predicted value for ten observations (31).

*Reliability of classroom observers.* A total of 7,777 "classroom gestures" was recorded by all the observers, along with the stimulus-words which immediately preceded the gestures, and the exact time at which they occurred. The variability range, for the classroom series, obtained by one group of observers was 961, and that obtained by the second co-observing group was 914.\*

\* The fact that these ranges appear so similar to each other is an indication in favor of uniformity and reliability of observation. It is rather a wide range, however, and indicates varying degrees of efficiency on the part of the individual observers.

So large a range would, of course, reduce the adequacy of the figures, were it not for the fact that the paired observers for each subject were different and distinct from the paired observers for every other subject. It is significant, for purposes of reliability, however, that the variability ranges for the two series came very close to being similar, and that the means for the two series (238 and 248) were closely similar. Naturally, a standard deviation would not be of great value, and, hence, the Pearson coefficient

TABLE 5  
THE TOTAL NUMBER OF GESTURES RECORDED BY PAIRED OBSERVERS IN THE CLASSROOM

Subjects	Number of Gestures Recorded by Observer A	Number of Gestures Recorded by Observer B	Number of Common Gestures Recorded by Both Observers	Per cent of Common Gestures in A's Record	Per cent of Common Gestures in B's Record
L. G.	1,036	996	461	44.4	46.3
F. F.	153	222	56	36.6	25.2
H. B.	277	258	55	19.8	21.3
F. P.	311	326	79	25.0	24.7
J. K.	231	199	129	56.8	64.8
M. W.	75	82	21	28.0	25.6
L. W.	122	177	52	42.6	39.0
L. L.	223	239	69	30.9	28.8
L. F.	140	129	53	37.8	41.0
H. S.	144	95	36	25.0	37.5
O. O.	151	184	85	56.2	46.1
G. W.	103	119	19	18.4	16.0
H. N.	174	190	64	36.7	36.2
S. K.	244	357	92	37.7	22.7
E. M.	271	269	178	66.1	65.6
R. S.	150	130	48	32.0	36.9
Var. Range	961	914	Var. Range	47.7	49.6
Mean	238	248	Mean	37.0	36.0
Spearman $\rho$	0.93		Spearman $\rho$	0.84	
Pearson $r$	0.95		Pearson $r$	0.85	
PE, $\rho$ or $r$	$\pm 0.01$		PE, $\rho$ or $r$	$\pm 0.05$	

of correlation, involving the use of the sigma, was not sought outright.\* Instead, the Spearman rank-difference coefficient of correlation was obtained, and the Pearson coefficient was computed afterwards from the formula  $r=1.0233\rho$  (10, 14). This generally altered the second decimal to the extent of one or two points.

Table 5 indicates that what we were getting at was something which was reliably recorded, and something which really existed.

\* A sigma (or standard deviation) would have limited meaning in our case where various observers were used for each subject.

The reliability of the classroom observers, as observers, was tested by correlating the number of gestures recorded by the two co-observers for each subject. This correlation has yielded a Spearman rank-difference coefficient of  $0.93 \pm .01$  (or a Pearson coefficient of  $0.95 \pm .01$ ). The reliability of classroom observa-

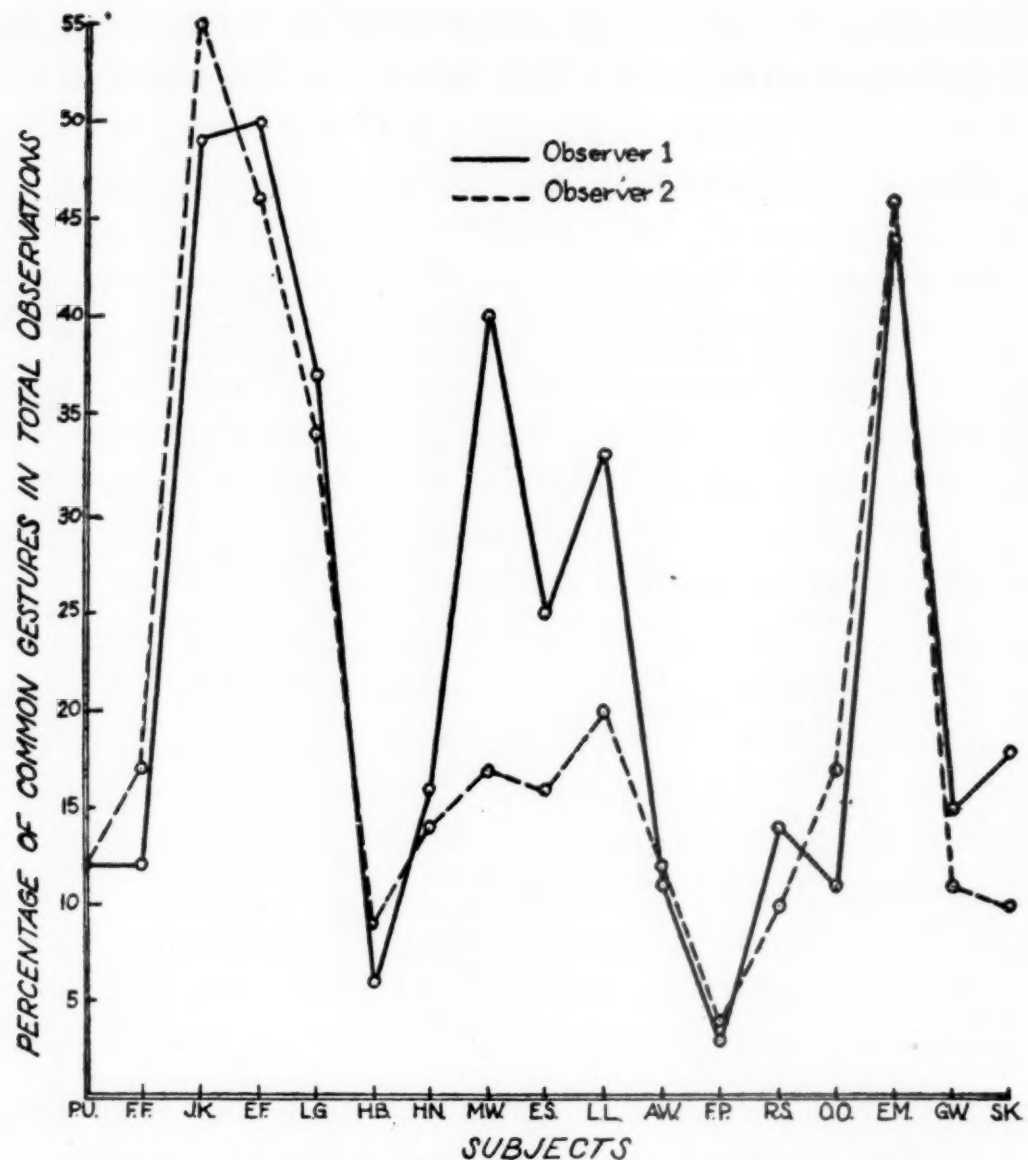


FIG. 1. GRAPH SHOWING RELATIVE EFFICIENCIES OF CLASSROOM OBSERVERS

tions, in other words the degree of similarity between the classroom gestures recorded by the two observers, was tested by correlating the percentage of the gestures in each observer's series which agreed with the percentage gestures recorded by his co-observer (see Fig. 1). A Spearman coefficient of  $0.84 \pm .05$



(or a Pearson  $r$  of  $0.85 \pm .05$ ) pointed to a high reliability of the observations made in the classroom.

There was another way, for us rather important, which we used to determine the reliability of our observations. This was to compute the observation-frequency of each observer, that is, to determine how often he had made and recorded observations. This observation-frequency is not to be mistaken for the reaction-time of our observers, including as it does, besides the temperamental variations of observers, also the duration of the gesture, the time consumed in recording pertinent facts, and the duration of the gestures *per se*. Observation-frequencies were obtained by deducting the time of each preceding, from the time of each succeeding, observation recorded, and then calculating the mean for the intervals listed. Thus, for example, if the time of recording presented such a series as

1. 10:01 A.M.
2. 10:03 A.M.
3. 10:04 A.M.
4. 10:07 A.M.

then deducting, consecutively, the second from the first, we get two minutes, plus one minute, plus three minutes, or a total of six minutes and an average—for three intervals—of two as an efficiency-differential. On obtaining the means, we computed the differences between the observation-time frequencies of the individual observers. The value obtained we have called the efficiency-index-differential. The importance of this, for our purposes, lay in the fact that we counted only those gestures which had fallen within the limits of the efficiency-index-differential of the co-observers concerned. In this way we estimated the general reliability of the classroom observations, and made certain that the words selected for study under controlled conditions actually had reference to the gestures recorded.

*Difficulties in mute association.* The first problem in the employment of the mute-association technique lay in determining where, in relation to a given stimulus-word, the motor-series began and where it ended. Our decision was to revert to our experience with free-chain association in the verbal series. We

took the point of stoppage to be a point of blocking, though there are other ways of verbally terminating an association series. Since those other ways were not objectively available to us, we assumed that the point at which the subject went into a frozen gesture was the end of the series. Since the subject was instructed to return to the normal anatomical position at the tapping signal, we were also moderately certain that the new series began at the point where the verbal stimulus was given.

Frozen gestures which the subject changed while within the minute-allowance, were, of course, common; and those, too, were taken to be indications of blockage which, however, led into other associations when the subject adjusted himself to the emotional association evoked. Such blockage, in the entire mute-association experiment, did not exceed, by count, 7.4 per cent of the total number of gestures recorded. It sometimes happened that, whether the subject had assumed a frozen gesture or not at the end of the allotted time, he "exploded" and over-ran the series, when given the tapping signal, by quickly making a few compulsive gestures before assuming the normal anatomical position once more. In all such cases, these overflow-gestures were recorded as of the preceding stimulus-word. Their importance for us lay in the fact that these overflow phenomena showed additionally that the motor series was a reality, and that the associations were as clearly determined by the preceding movements as one word in a verbal series is clearly determined by the word preceding it, whether known or not.

Generally speaking, the speed of association in the motor-series was greater than that in an ordinary word-chain association. One reason for it is the heightening of muscle tonus in mute-associations, due to the release of emotional tension through one channel only, as compared with word-associations in which both motor movements and laryngeal movements may be employed as outlets. Aside from that, we noticed that the omission of items in a series is no less present in mute, than in verbal, association. In both, gaps are left which do not permit of ready interpretation by an observer. Whether these gaps are wider in motor-associations has not been determined.

It is understood that most of the shortcomings of free-observation generally inhere in the observation of associated skeletal-motor movements. But this type of observation has certain shortcomings of its own. As already noted in connection with classroom procedure, some observers "specialized" in certain kinds of muscle movements, reporting sniffing, yawning, and similar *smooth-muscle* operations; while others reported *skeletal* movements such as body jerks, arm and leg movements, etc., most frequently. Some of the observers were especially intent on "catching" suspended movements, while others were on the watch for changes of position. Some observers concentrated on direction of movement with reference to surrounding objects, while others observed these changes insofar as they were related to the rest of the organism. The speed of recording and memory for observed phenomena also serve to account for differences in recording, especially where the order of presentation differed.

In the majority of the cases there was of course considerable correspondence. Yet the difficulties listed indicate what may be expected when observation is carried on from two points of vantage, and by two different persons. Judging from the minuteness of observation, the paired observers were all creditable workers; but the difficulties of correlation were present nevertheless. The only way in which we could offset them was by checking the two records, first proceeding from I to II, and then reversing the process. We discovered that the possibilities of error did not exceed 0.5 per cent. A rather satisfying constancy in the number of gestures recorded was also found. We compared the number of gestures recorded by observer I in each of the two mute tests, and then compared the number of gestures for II in the respective tests. We discovered that each observer tended to record the same number of gestures each time, the variations being well within 5 per cent of the total recorded.

*Reliability of mute-test observers.* After establishing the reliability of a random sample of gestures gathered in the classroom, we constructed a list of reliably recorded crucial words, and



added the non-crucials. With this combined list in hand we proceeded to give the following tests:

1. discrete association
2. discrete reproduction
3. free-chain (verbal) association
4. free-chain (mute) association I—with non-crucials
5. free-chain (mute) association II—without non-crucials

A total of 10,098 gestures (4,615 by IA observers and 5,483 by IB observers) was recorded in the first mute test, and a total of 5,772 (3,163 by IIA observers and 2,609 by IIB observers) gestures was recorded in the second mute-association test.

The reliability of mute-association-test observers, as observers, was established, first, by the correlation of a random sampling of gestures recorded by observers A and B for ten words selected from the crucial series in each of the tests. The reasons for using a random sampling were several. In the first place, the recordings for the non-crucial words had not been as accurate as those for the crucials. Knowing which words were crucial and which were not, the observers often relaxed their vigilance while observing responses to the non-crucial series. Another reason is that the ten-word sample was obtained with greater care in procedure than might have been employed with the gestures in the total count.

Since the gestures here correlated were not necessarily of the same kind, the table given next represents merely the reliability of the recordings from the point of view of the general efficiency of the observers, rather than from that of the reliability of the observations as such.

It will be observed from Table 6 that there is a definite correlation between the number of observations made in mute tests I and II. The reliability coefficients expressed by Spearman  $\rho$  ( $0.71 \pm .09$  in the mute I correlation and  $0.65 \pm .11$  in the mute II correlation), as already stated, were based on a random sampling of the crucial-word gestures, and showed clearly that the frequency of entry and the total efficiency of the mute observers were indeed acceptable. It seemed even more significant, how-

ever, to find a qualitative agreement of entries made by each observer.

In order to obtain an index of qualitative agreement we listed the number of gestures recorded by the observers in each of the tests, and attempted to correlate them with the number of gestures, in a ten-word sample, which were found to be in agreement for their respective records. Below is a sample of the type

TABLE 6  
THE RELIABILITY OF OBSERVERS IN MUTE TESTS AS DETERMINED BY A  
SAMPLING OF TEN CRUCIAL WORDS RECORDED IN TESTS I AND II

Subjects	Number of Gestures Recorded by Observer A in Experiment I	Number of Gestures Recorded by Observer B in Experiment I	Number of Gestures Recorded by Observer A in Experiment II	Number of Gestures Recorded by Observer B in Experiment II
J. K.	189	209	185	198
L. F.	77	126	58	128
H. S.	184	179	236	226
H. B.	317	222	317	252
F. F.	181	130	138	98
O. O.	151	139	169	214
L. L.	265	292	207	202
H. N.	121	194	106	141
G. W.	145	230	88	228
E. S.	235	276	259	152
L. G.	368	223	460	264
R. S.	62	68	61	64
M. W.	130	164	204	187
Var. Range	306	224	402	200
Mean	186	189	191	181
Spearman $\rho$		0.71		0.65
Pearson $r$		0.73		0.66
PE $\rho$ or $r$		$\pm 0.09$		$\pm 0.11$

of comparison in which the correspondence sought might be said to have obtained:

IB—Rubs cheek and forehead	IA—Hand over side of face and forehead
IB—Scratches left side of upper lip and nose	IA—Hand is taken from cheek and pinches nose
IB—Left hand over head and ear	IA—Leans head on left hand
IB—Left foot strained in shoe	IA—Stretches foot
IB—Right hand on desk, holding pen suspended	IA—Pen suspended

Obviously, allowances of a reasonable nature had to be made for differences in phraseology, in detail of observation, and in

time of observation. An illustration of the latter would be a case where one observer recorded: "Closed book," and the other "Opened book." Both entries were accounted correct on the grounds that the first had probably caught the beginning, and the second the ending, of a gesture series.

TABLE 7

A COMPARATIVE ANALYSIS OF THE NUMBER OF GESTURES RECORDED BY THE TWO OBSERVERS IN EACH OF THE MUTE TESTS, AND THE NUMBER OF CORRESPONDING (COMMON) GESTURES FOR EACH OBSERVER  
(Based on Random Selection of Ten Stimulus-Words)

Subjects	Mute Associations IA and IB			Mute Associations IIA and IIB		
	Number of Gestures Recorded by Observer A in Mute Experiment I	Number of Gestures Recorded by Observer B in Mute Experiment I	Number of Common Gestures Recorded by Observers A and B in Mute Experiment I	Number of Gestures Recorded by Observer A in Mute Experiment II	Number of Gestures Recorded by Observer B in Mute Experiment II	Number of Common Gestures Recorded by Observers A and B in Mute Experiment II
R. S.	93	95	70	83	81	51
M. W.	82	82	41	94	..	..
J. K.	92	105	43	75	81	31
L. F.	31	48	20	32	64	14
F. P.	88	78	41	157	..	..
H. S.	76	51	40	89	95	50
H. B.	92	118	41	91	135	49
F. F.	49	50	20	76	46	28
O. O.	81	70	29	101	127	33
L. L.	103	121	66	82	75	43
H. N.	79	145	52	77	97	40
G. W.	93	80	39	38	84	30
E. S.	115	86	41	111	94	44
L. G.	91	61	29	97	68	41
P. U.	65	84	33	68	83	32
Mean	82	85	40	83	87	37

Spearman  $\rho$

(Gest. IA and Corresp. Gest.):  $0.63 \pm .11$

(Gest. IB and Corresp. Gest.):  $0.85 \pm .05$

(Gest. IIA and Corresp. Gest.):  $0.70 \pm .09$

(Gest. IIB and Corresp. Gest.):  $0.45 \pm .15$

On this basis then we sought a more accurate type of correlation for the reliability of the mute-test observers. This was an attempt to correlate the totals recorded for ten gestures by each observer with the gestures which both had recorded and which seemed to be in close agreement with each other. As seen in Table 7, this correlation has yielded three (out of four) signifi-



cant coefficients ( $0.63 \pm .11$  for the IA observers;  $0.85 \pm .05$  for the IB observers;  $0.70 \pm .09$  for the IIA observers; and  $0.45 \pm .15$  for the IIB observers). The difference in the reliability of the observers in the IIB group, as compared with the reliabilities in the other groups involved, may be attributed to the lack of data on two of our subjects. Where the number of items in the series consists of only fifteen, such a reduction might throw off the calculations sufficiently to produce a spurious coefficient.

Theoretically, of course, there should be no distinction between the IA and IIA correlations, on the one hand, and the IB and IIB correlations, on the other, provided no special factors affect one of the series involved. The fact that we have obtained high coefficients on the IB and IIA recordings should indicate the reliability of our data with sufficient theoretical accuracy for us to accept them. It may be noted that our coefficients compare favorably with the reliability indices obtained, for physical contacts, at Yale (Ch. 4, Sec. 3) and with the coefficient obtained by Olson for gesture-studies.

## CHAPTER FIVE

### DETERMINATION OF CONSISTENCY OF AUTISTIC GESTURES

Every scientific experiment seeks the reproduction of observed behavior under experimental stimulus-conditions. In the case of gestures, the problem of their existence as specific responses hinges entirely on whether or not we could demonstrate their tendency to reappear under experimental conditions. This implies the need of testing gestures for intra-individual consistency. By correlating the gestures obtained in a given subject at one time with those obtained in the same subject at another time, we obtain evidence of the degree of gestural consistency.

Several approaches were possible. One was to correlate the gestures obtained in classroom observations with those obtained in our mute-association tests. Another lay in the possibility of intercorrelating the gestures observed in the successive mute tests themselves. A third approach seemed to lie in the comparison of classroom gestures with those observed as overflow phenomena, in the course of the verbal discrete-association and in reproduction-tests. Finally, it appeared valuable to attempt a correlation of autistic gestures observed in an uncontrolled situation with those possible to reproduce in a deep hypnotic trance.

To speak of the reproduction of a given response is to speak of something which is possible, in any case, under ideal conditions of similarity. To speak of the reproduction of an instance of conscious behavior involves immediate difficulties due to the operation of conscious inhibition even under conditions similar to those originally present. But the study of non-conscious behavior, insofar as it requires repetition of original conditions, suggests difficulties of a special order. In the first place, there is evidence of what has been called non-conscious resistance, or non-conscious inhibition. In the second place, there is the possi-

bility of conscious inhibition of the response even if it does occur in part.

For the reproduction of autistic gestures, then, already shown to be non-conscious and relatively intractable by the actors, the conditions would have to be such that non-conscious, or abstracted, behavior might be possible. We have found the association-tests—both verbal and mute—to be well adapted to our purpose. For, even though autistic gestures are ordinarily intractable and not observed by the subject, yet they are subject to inhibition when the conditions under which the subject is behaving are such as to evoke a liminal or supra-liminal state of reactivity. Indeed, this is where the distinction between autistic gestures and tics seems to lie. The latter are not merely beyond detection but they are also beyond the possibility of inhibition, by the subject. Through special requirements as to speed, response, etc., the association method makes automatic reproduction, *i.e.*, abstracted reproduction, possible, in the case of responses which could otherwise be rather easily inhibited, and so fail to appear.

*Classroom vs. mute gestures.* As already stated, one test of gestural consistency, for our data, lay in a comparison of the original (classroom) gestures with the later (mute) gestures, obtained, presumably, in response to identical stimuli. As in previous tabulations, we used a random sample of ten stimulus-words and their corresponding original and mute gestures.

The first task was to correlate the original series, expressing the number of gestures observed, with the corresponding series obtained in each of our mute tests. For the first mute test (columns 1 and 2) the correlation obtained was a Spearman rank-order coefficient of  $0.71 \pm .08$ , and for the second (columns 1 and 4) it was somewhat lower, *viz.*,  $0.57 \pm .12$  (Table 8). In both cases the error was well within the expected range, thus strengthening the probability that the correlations obtained were beyond the possibility of mere coincidence.

The probability of a still higher consistency-index appeared certain when we realized that the mute association tests were given within from four to eight weeks after the classroom obser-



vations had been made. Many personality factors might have entered in to change the motor picture by that time. The words used as stimuli might have changed their significance, and the individual's responses, because of intervening factors, might also have been somewhat modified. It is interesting to note that Allport and Vernon (2), using a battery of motor tests, found a

TABLE 8  
THE NUMBER OF ORIGINAL (CLASSROOM) GESTURES FOUND AMONG THOSE  
RECORDED IN RESPONSE TO TEN IDENTICAL STIMULI IN MUTE TESTS

Subjects	1 Number of Original Gestures to 10 Words	2 Original Gestures in Mute Experi- ment I	3 Per cent Original Gestures in Mute Experi- ment I	4 Original Gestures in Mute Experi- ment II	5 Per cent Original Gestures in Mute Experi- ment II
H. N.	19	6	31.6	5	26.3
L. G.	23	8	34.7	7	30.4
G. W.	16	3	18.7	2	12.5
J. K.	14	3	21.4	3	21.4
E. M.	31	8	25.4	7	22.5
M. W.	25	10	40.0	8	32.0
F. F.	20	5	25.0	4	20.0
A. V.	11	5	45.4	4	36.3
O. O.	12	4	33.3	5	41.6
P. U.	20	7	35.0	4	20.0
R. S.	18	3	16.7	5	27.7
H. S.	22	11	50.0	10	45.4
H. B.	19	8	42.1	9	45.2
L. L.	30	7	23.3	5	16.7
E. F.	25	7	28.0	6	24.0
F. P.	21	10	47.7	11	52.3
Mean	20	7	32.4	6	29.6

Spearman  $\rho$

1 and 2.....	0.71±.08
1 and 4.....	0.57±.12
3 and 5.....	0.77±.06
2 and 4.....	0.87±.03

discouraging reduction of consistency in their work, which they attributed to the lapse of time.

It is thus safe to say that, had these tests been given immediately or soon after the original observations had been made, and had we corrected for the general reliability of the observers, we might have obtained coefficients significantly higher than those actually obtained. In regard to the latter presumption, it may safely be said that while, undoubtedly, some of the original gestures had not recurred, because of some of the factors mentioned;

yet the observers themselves might not have noticed them; and, having noticed them, might not, in some instances, have recorded them; or, having recorded them, might have used language which did not closely parallel that originally employed.

One more use of the figures suggested itself. It occurred to us that another test of consistency could be obtained through the correlation of the percentages of the original gestures found in the first and second mute-tests. This correlation, obtained by the rank-difference method, was  $0.77 \pm .06$ , showing that well-nigh the same percentage of original gestures made their appearance in the one as in the other mute-association test (Table 8).

This type of correlation, however, raises some justifiable doubts. Granted that what it indicates is that the same number of gestures has recurred in mute test I as tended to recur in mute test II, what assurance have we that not merely the same *number* of gestures but the same types of gestures have thus recurred? The answer is that, since the original gestures, involved in any case, did not exceed three, and averaged only two, per stimulus-word, the chances are that what we obtained was not a spurious correlation. That is to say, because the original gestures were relatively the same in both series, we have correlated comparable quantities.

The conclusion just reached is strengthened by the correlation coefficient  $0.87 \pm .03$  obtained for the corresponding gestures discovered in mutes I and II (Table 8). This coefficient indicates that in the correlation of the two sets of results we have not dealt with perfect figures. Had the correlation in the present test given us a coefficient of 1.00, we might have assumed that the previous coefficients exhausted all possibilities of getting an accurate expression of discoverable relationships. The correlation obtained here, far from showing the data for the two series to be invalid, does indicate nevertheless that the other coefficients might have been increased by an hypothetical assumption of increased accuracy in our techniques yielding the "corresponding gestures" data.

If, in spite of these indications, it be claimed that, instead of measuring the consistency of classroom and mute gestures, we

have measured, in the last analysis, largely the consistency of two mute-test series, we might offer the rejoinder that such a finding would be quite significant in itself. If there is a high consistency between the gestures recorded in two separate mute-association tests, the index obtained has value for the further investigation of mute gestures as such. Further analysis, to test this particular interrelationship by a more accurate study of the mute tests themselves, was apparently indicated.

*The intercorrelation of mute motor-movements.* Table 8 has shown that the classroom gestures had a significantly high tendency to recur in controlled situations in which the same stimuli were present. We may now continue with Table 9, in which the comparison made is between the gestures recorded by each observer in each of the mute-association tests. The situation, the specific stimuli, and the observer being the same, we may assume that what we are testing here is the tendency of the gestures themselves consistently to recur under similar conditions. The fact that the observers were the same in each case would not of itself assure us of consistency, unless we established the fact that the observers acted with approximately the same degree of efficiency; in other words, unless we could show that they were consistent with themselves.

Correlating the percentages of corresponding gestures recorded by a given observer in each of the two series would give us the degree of constancy with which the gestures tended to recur. The coefficients, obtained by the rank-difference method, being  $0.83 \pm .05$  and  $0.77 \pm .07$  (Table 9), we may reasonably assume that the observers in these experiments were relatively consistent with themselves.

Indeed, then, what remains to be assumed is that, if we correlate the total number of movements recorded for ten stimulus-words (selected at random), in the first mute-association test, with the number of movements which agreed with those recorded by the same observer in the second mute-association test, we shall thus test the consistency of two comparable reaction series. What we have obtained is four correlation coefficients (for the paired





observations of each of the observers) which are markedly low and unreliable (Table 9).

In order to understand this result we must realize clearly the nature of the data which we have been analyzing. The observations consisted of long series of motor-movements, presumably related to the original stimuli but, because of the free-association processes involved, undoubtedly related to a great many other, intra-organic, stimuli which welled up subsequently. It would be incorrect to assume that extra-organic stimuli (of an uncontrolled nature) did not, to some extent, impinge on the subjects and produce responses not related to the association-chain evoked. The responses observed were thus related to inner and outer stimuli, superadded upon the crucial extra-organic stimuli provided, and thus hardly capable of careful study or comparison by statistical methods.

This statement is important for the realization of the value of the findings with regard to our classroom gestures. It may be argued that there is a certain organismic consistency, contingent on the number and types of conditionings to which the individual had been exposed. On this basis, it may be further argued, the individual, in a given series of responses, would have to reproduce certain of his previous gestures, since his repertoire of gestures is necessarily limited. The statistics appearing in the table under discussion seem to disprove this possibility. For it appears that, when a long-enough series of responses is reliably observed, as was the case here, on two different occasions, though in similar settings, the chains do not tend to be similar in kind, let alone similar in order. This is important, in that it shows that the high correlation found between the few classroom gestures and the mute-association gestures (generally the first few) is a meaningful correlation, far from being chance in nature, and far from being similar to the heterogeneous motor-movements of an individual under uncontrolled conditions.

The conclusions just reached do not contradict the previously reported findings of Allport and Vernon. The latter, trying to show that consistency of movement exists under comparable conditions have not made the claim that seriated motor-movements

occurring in uncontrolled situations, necessarily tend to be consistent in a given individual. Such a claim would not be warranted. Man is not an automaton. His movements tend to become newly conditioned under different conditions, even as they tend to be similar under similar conditions. All that our data seem to show is that in the average run of events, stimulus-situations are not sufficiently similar to evoke comparable reactions. For our purposes this is important insofar as it differentiates between uncontrolled motor-movements, occurring in response to a *variety* of inner, and possibly outer, stimuli, and autistic movements occurring only in the presence of *certain kinds* of stimuli.

*Classroom versus discrete-test gestures.* Another test of gestural consistency was employed in conjunction with the discrete word-associations to the crucial words. It was our theory in this case that the discrete-word tests did not always yield the actual complex-word; or else, when they did, the complex-word did not express the entire implicit response of the individual; the remaining parts of the phrase or sentence, in that case, being necessarily symbolized in the accompanying motor movement.

At the end of a series of tests the classroom gestures and the gestures in the first and second association-tests were compared. One subject was used in this experiment, and the gestures obtained were examined with the view to establishing symbolic correspondences.

The following examples represent what we have designated as absolute correspondences. Here, it will be noticed, act and organ have been equated.

<i>Stimulus-words</i>	<i>Original Gesture</i>	<i>Reproduced Gesture</i>
Important thing is	Yawns	Yawns
Heart activity	Left hand hitches at dress	Hitches at dress at both sides
Stupid	Right foot raised up and down on heel. (Left hand resets spectacles)	(Hands hold each other on desk) Feet raised up and down. (Polishes and manicures fingernails)

The examples below represent what we have designated as symbolic correspondence. The intention here was to equate the



gestures on the basis of the general type of activity engaged in, rather than on the basis of both activity performed and organ involved.

<i>Stimulus-words</i>	<i>Original Gesture</i>	<i>Reproduced Gesture</i>	<i>Association I Gesture</i>	<i>Association II Gesture</i>
Not at all unusual	Plays with bracelet of left hand		(Hesitates, as if to talk. Eyes averted)	Raises finger. Rubs middle finger
Stable balance	Digs under hair at top of head with left forefinger	Pulls at clip of pen		
To speak of	Shifts body in seat. Right foot raised on heel	Picks fingernails. Screws and unscrews pen-cap		

Symbolic correspondence, as we have looked at it, carries the implication of somewhat similar activity, regarding the latter from the point of view of non-conscious mechanisms of adjustment. The aim, it will be noticed, was to provide three opportunities for the subject to "slip through" a motor movement, and to compare the movements obtained with those originally observed. Of course, the results were suggestive rather than conclusive. (See Table 10.)

The limitations placed upon this experiment are due, first, to the fact that only one subject was employed; second, that much of the repression was drained off by way of the laryngeal channel; third, that in no case was the same gesture repeated with unvarying certainty in all three test-situations; fourth, that even absolute correspondence could be materially reduced, if we took into consideration the fact that in some of the three test-opportunities no gestures of any sort were included; fifth, that questionable resemblances were placed under the heading of "Symbolic correspondences"; and finally, that there were definite limitations of language and observer's ability to detect and record the movements. In spite of these limitations, the experiment was found to present certain possibilities for further study.

*Hypnotic reproduction of autistic gestures.* The problem in this experiment was to determine to what extent gestural stimuli,

when isolated, could be used to evoke gestures, previously observed in the waking state, when the subject is placed in a hypnotic trance. The experiment raised again some of the questions previously answered by other methods, but, in addition, brought up the question of the reproduction of non-conscious behavior-patterns in a state of extreme concentration, such as hypnosis represents.

The set-up in this experiment was as follows: The subject, who had previously been placed in a trance by the experimenter, was present in the latter's office on an informal occasion. While conversing, the subject was observed by an assistant seated behind a desk, somewhat at a distance, without taking part in the conversation. As the conversation took place, the assistant, fol-

TABLE 10

## RECURRENCE OF GESTURES IN AN EXPERIMENTAL SUBJECT

Type of Correspondence	Frequency	Percentage
Absolute correspondence . . . . .	25	45
Symbolic correspondence . . . . .	14	26
No correspondence . . . . .	9	16
No gesture reproduced . . . . .	7	13
Total number of gestures . . . . .	55	100

lowing a prearranged scheme, recorded the stimulus-words, occurring in the course of the conversation, and the subject's gestures interspersed with his replies. At the end of the conversation, the subject was asked whether he would wish to go through a memory experiment requiring the use of hypnosis. The subject consented. The interview reported below occurred between 2:30 and 5:20 P.M. The hypnotic experiment occupied an hour beginning at 5:20 and ending at 6:20 P.M.

The subject was seated in a soft lounging chair. For purposes of hypnosis he was asked to relax, as usual. A head-band, with a shining sphere suspended from it over the subject's eyes, was placed on his forehead. The subject was asked to concentrate on the brightest point in the sphere, and to continue concentrating until in a trance. The usual suggestions were offered to facilitate passing into a deeper trance.

While in the trance the subject was given the stimulus-words.

## COMPARISON OF GESTURES OCCURRING IN WAKING STATE AND IN HYPNOTIC TRANCE

<i>Stimulus Words</i>	<i>Motor Response During Interview</i>	<i>Motor Response in Trance</i>
1. "Something lacking"	Palms together; held above lips; fingers interlaced.	Palms together; fingers interlaced.
2. "I am trying to analyze myself,"	Feet crossed; head thrown back; (grim look on face).	Feet crossed; head back (grim look).
3. "Higher position? No!"	Lips move; lower lips and chin out.	Lips move; then out.
4. "Political pull?"	Chin out.	Chin pushed out.
5. "Living up to preachings"	Hands held above head; elbows bent; hands to back of head (almost suspended).	Hands up; elbows bent as if stretching.
6. "Food, clothes, and shelter" (speaking of his mother furnishing them)	Left hand to chin and around mouth; thumb and index finger pressed against face.	Left hand to chin and around mouth, throat, and index.
7. "She has given me food till I was fifteen"	Left hand on left knee rubs around knee top; left foot out.	Left hand on left knee; rubs in circular motion on knee top; left foot swings out.
8. "Scoldings and whippings"	Left foot wiggles from side to side (legs still crossed).	Left foot wiggles from side to side.
9. "I've seen so much of it" (punishment)	Rubs upper left leg with circular motion.	Circular rubbing of upper part of left leg.
10. "Not now" (intimate with mother)	Hands folded on lap; feet kick out and wiggle.	Hands folded in lap; foot kicks out.
11. "One is five and one is six years my senior" (sisters)	Rubs palms together.	Rubs one palm against another.
12. "May be pleasing the last year or so"	Swings body far to right; then to left; then sits straight.	Swings body far to the right, and then to the left.
13. "Had to do with my sisters"	Puts fingers in ash tray; pats top of tray with fingers.	Puts left finger in ash tray; pats it.
14. "Different kinds of people"	Pulls up right sock with right hand.	Pulls up right sock.
15. "Predominantly red or grey" (K)	Both hands grip ash tray; right thumb on top of ash tray; right hand holds tray.	Right hand grips ash tray; right thumb on top of ash tray; right hand holds side of tray.
16. "Means well or ill" (K)	Tongue far out.	Tongue out.



17. "Take while taking is good"      Finger scratches up and back on ankle of right leg.      Fingers scratch ankle back and forth.
18. "Many eccentricities"      Pushes right palm down on top of ash tray, as other hand holds it.      Pushes right palm on top of ash tray.
19. "What kind of fellow are you?" (K)      Draws up fast; spills ash tray on smoking stand.      Draws up fast; spills ash tray; brushes trousers off and puts tray away.
20. "What do you think of that kind of fellow?" (K)      Leans on left knee and to the left (almost suspended).      Leans on left knee as leans to the left, puts left leg on right; jaw forward.
21. "Try not to repeat what you have said" (K)      Puts left hand to side of face; right hand on right ankle as legs crossed; rubs ankle.      Puts left hand to side of face; right hand to ankle.
22. "On the whole—considering everything" (K)      Leans forward; swallows; right hand to ankle; holds it suspended.      Leans forward; swallows; right hand to left ankle; holds ankle.
23. "May I ask you to tell me about myself"      Licks lip; (this suspended); left hand to chin; right hand to ankle; then away to arm of chair.      Licks lip; exhales; sits back; left hand to chin, right hand to ankle.
24. "I must be a stolid individual"      Chin and lower lip out; hands folded around left leg (gesture suspended).      Chin and lower lip out; hands around left leg.
25. "What a hypocrite he is"      Puts chin forward.      Puts chin forward.
26. "You have read Kuprin?"      Both hands on knobs of arms; then runs both hands along arms of chair; pushes hands forward and draws them back.      Both hands on knobs of arm-chair; pushes forward and back along arms.
27. "May be conceit"      Foot turned inside shoe.      Foot turned in shoe.
28. "Change in economic life"      Tongue out.      Tongue out.
29. "To work for a change"      Slouches down; left foot turned inside shoe.      Stretches while moving down; foot turned in shoe.
30. "I may broaden that statement on the hypocrite"      Hands stroke knobs of arm on arm-chair.      Hands stroke knobs of arm-chair.
31. "Give them the high sign"      Moves forward; leans to left; leans on left arm; left hand around knob of chair (somewhat suspended).      Bends forward; leans to left; leans on left arm, right hand around left hand on knob of chair.
32. "I had to"      Right foot points up, as right leg goes over left.      Right foot points up; shifts in the middle of the chair.
33. "Lying—in a sense"      Right hand wraps itself around knob of chair.      Right hand fingers knob of chair; closes on it.

collected by the assistant in the course of the interview, and was asked to "act exactly as he had acted" during the conversation. The instructions were understood to refer to both speech and gesture relevant to the stimuli provided. The stimuli were given in the order in which they had been recorded. The stimulus-words appearing below are the subject's own, unless the letter "K" follows the phrase.

This experiment was repeated with two other subjects, and similar results were obtained. The reproduction of gestures first manifested in the waking condition was virtually absolute. The value of these experiments lies in the fact that they show autistic gestures to be not accidental or casual but, instead, to have a definite place in the stream of conversation; and that these gestures are reproducible, though they apparently require for their reproduction a state of extreme concentration.

The evidence submitted by Hull and others would seem to argue that there is no significant difference between recall in the trance and in normal states, in the case of nonsense- and number-material (15). But, in those experiments, the material was first learned consciously. The clinical evidence submitted by those who have employed the hypnotic technique is overwhelmingly in favor of the assumption that the recall of a traumatic experience which had been repressed or reduced to the non-conscious level is greatly facilitated by the hypnotic trance. It is fair to say, therefore, that the gestures occurring in an uncontrolled situation, without the knowledge of the subject (or else they would bear some relevancy to the conversation) can not be equally well reproduced when the subjects behave normally.

The question may well be asked as to what the results might have been if we had not given the subject instructions to recall what he had done, but had, instead, merely given him the stimuli recorded and observed his responses to them. We have actually attempted to follow this plan, with subjects in a light trance, and obtained results similar to those obtained in the waking state. We have not attempted the experiment with a subject in a deep trance; but, in any case, we should not expect anything much different from what we have obtained in light-trance states.

The experiment we have tried, it seems to the writer, established some facts which no other technique could have established. The command: "Remember!" does not make it possible for the subject to do anything he had not done before (15). It demonstrates what the subject has done and what he could recall of what he had done. The importance of the technique used in this experiment, therefore, far from establishing merely recall-possibilities under hypnosis, shows first, that autistic gestures are, under ideal conditions, completely reproducible; and second, that these gestures are not mere accidental overflow-phenomena of no significance to the organism, but conditioned responses subject to reproduction and recall, under conditions of extreme concentration. Were they merely conscious, they would be subject to recall on the conscious level. Requiring as they do abstracted (or subliminal) conditions, in the waking state, or deep trance (supraliminal) conditions, in the hypnotic state, for accurate reproduction, they must be regarded as non-conscious, or subliminal, phenomena capable of reinstatement on either a non-conscious level or in a state of extreme concentration such as hypnosis.



## CHAPTER SIX

### DETERMINATION OF EMOTIONAL ORIGINS OF AUTISTIC GESTURES

In order to determine the emotional basis of autistic gestures we employed the various association techniques. The stimulus-words found to be connected with gestures we have called crucial words. Simply asking a subject to associate to, or to reproduce, these words would not give us valid, even if it did give us reliable, results. In order to obtain valid results we must use controls. This meant improvising control techniques for association tests, and it meant providing safeguards against perfunctory controls of the type in which experimental and controlled results are not obtained under similar conditions. It meant also leveling over as many as possible of the differences between the control and the experimental groups, in order to render them otherwise comparable. Lastly, it meant that caution must be exercised in the interpretation of results obtained.

We employed eight methods of controlling the results. The methods were arranged in such a way that they could at once test the validity of the results obtained in a given experiment, and check the validity of previously obtained results. The methods involved stimulus-words, reaction-time, and subjects as control material, in successive experiments.

First, we used words which were supposedly of an emotionally indifferent nature. These words we denominated non-crucial words. Added to the crucial stimulus-words in irregular order, they served as one type of check on the results obtained with the latter words alone. Clearly, if the non-crucials have as many complex-words among them as the crucials do, then the crucials can not be said to be of specific value to the individual—that is to say, they are as likely as not to have emotional significance. What we did, therefore, in this type of check, was to compare, in a given group of subjects, the *percentage* of single, double, and

triple (including higher) complex-words in the *non-crucial* series with the *percentage* of the same types of complex-words in the *crucial* series.

Second, we singled out the association reaction-times obtained for a group of subjects, and studied them comparatively for each series. Our reasoning was that a comparison of the average reaction-time obtained for the crucials with the averages obtained for the non-crucials ought to reveal a definite relation between them. For reasons which need not be rehearsed, we assumed that a longer average reaction-time, whether in an individual or in a group, was more indicative of emotional difficulty than was a shorter average reaction-time. In establishing our results with definiteness we compared the average association reaction-time of the crucial and non-crucial series with each other, as well as with the average *total* reaction-time for both series, in the case of each subject involved.

Third, we counter-posed the responses to the crucial and non-crucial words, obtained in a given subject at a given time, to those obtained, in the same subject, at another time. The crucial words remained the same, but different sets of non-crucials were employed in each test.

Fourth, we attempted to compare the percentages of complex-words (of the three varieties mentioned) in each crucial and non-crucial series, obtained in a given experimental subject, with the percentage obtained in a group of control-*subjects* given the same association-tests under substantially similar conditions.

Fifth, we resorted again to a comparison of reaction-times, but, in this case, we compared the results obtained for the crucial and non-crucial series, in the case of a single experimental subject. In addition to comparing them with each other, we compared each of them with the total average reaction-time of the same subject. We repeated this comparison in a group of controls given an identical test.

Sixth, we studied reproduction reaction-time in the same way as association-time. This seemed especially advisable in view of the arbitrariness which we exercised in treating supra-average and infra-average reproduction-times as complex-indicators. In



this experiment we had a chance to estimate, in a more reliable way, the relative value of reproduction-time in group-controlled tests. Obviously, errors of this sort present in a general study of complexes might thus be rectified.

Seventh, we employed two groups of subjects: An experimental group and a slightly smaller control-group. In doing so we were again interested in mass-comparisons as to (a) the percentage of complex-indicators in each series, (b) association reaction-times, and (c) reproduction-reaction-times of each group. An important feature of this experiment was the fact that each of the subjects in the experimental group was given crucial words based on his own gestures but the same non-crucial set as was given to the rest of this group. The subjects in the control group, on the other hand, were given the crucial words of two of the experimental subjects, plus the same set of non-crucials.

Eighth, recognizing the danger of selecting innocuous control-words, and thus obtaining results by an *a priori* method, we decided, after considerable experimentation, to select our control-words in a way which would obviate this possibility. Even though this was not a different method of procedure, in a quantitative sense, it proved to be important from a qualitative point of view.

*Group association studies with selected control-words.* The technique followed in obtaining crucial stimulus-words from gestures observed under free conditions in college classrooms was described in Ch. 4. The construction of the word-association list for the experiment depended on the words recorded for the classroom gestures and a group of words selected from the well-known Kent-Rosanoff word-association list. The latter was chosen because, unlike the Jung, the Wells, and other word-association lists, it is not intended to tap emotional difficulties but, rather, to serve as a test of the degree of socialization or individualization shown by an individual in an urban environment. Such words from the Kent-Rosanoff test as chair, table, vegetable, color, town, salt, etc., are not expected to be of emotional significance to the average individual. Of course, some of them



may prove to be emotionally tinged in special instances, as a result of certain experiences, but the chances are strongly against their being, as a group, charged with emotion. The assumption was therefore that, if the crucial words were likewise incapable of producing emotional reactions, the two series would tend to appear pretty much alike.

The number of crucial words used ranged from twenty-two to twenty-nine. The order was generally *ababab*, and occasionally *abbabb*. Fourteen subjects coöperated in this experiment. The analysis of their records made it possible for us, following previously mentioned criteria, to separate emotionally charged from emotion-free words in the series. Long reaction-time, checked in both association and reproduction tests, was calculated from the deviations from the mean of the subject. Short reaction-time was not considered significant, unless it was less than half the mean reaction-time of the subject. Short reaction-time was not regarded as in any way significant in the reproduction tests.

The responses were analyzed regardless of whether they belonged to the crucial or the non-crucial group. When it was not clear as to whether a given complex-indicator applied, a question mark was recorded instead of a check mark. In this way the words divided themselves into the following categories:

1. complex-free words
2. words with single complex-indicator
3. words with double complex-indicator
4. words with triple complex-indicator
5. words with more than three complex-indicators.

In Table 11 are classified the results obtained with these fourteen subjects. The crucial and non-crucial words are separated in each case. In the vertical columns appear the responses classified on the basis of three complex-indicators, two complex-indicators, and one complex-indicator. In the latter case it is specified whether the indicators referred especially to reaction-time, reproduction, or the quality of the original response. Then, the table gives the number of the stimulus-words of each type, used in each subject's test, as well as the total number of

TABLE 11  
RELATIVE VALUES OF CRUCIAL AND NON-CRUCIAL STIMULUS-WORDS, AS DETERMINED BY ASSOCIATION TESTS

Subject	Type of stimulus word	A		B	C			D	E	F	G	H	I	J	K	L	M	N
		Triple complex indicator	Double complex indicator		Single complex indicator	Reaction time	Association											
H. B.	Noncrucial			7	5	3	1	20	29	62	0	8	9	1.26	31%			00%
	Crucial				6	7	4	9	33		7	20	24	1.50	73%	1.39		21%
E. F.	Noncrucial	1			2	3	2	17	25		1	6	8	2.12	32%			4%
	Crucial	1	8		7	3	1	6	26	51	9	19	20	3.11	77%	2.62		35%
F. F.	Noncrucial	2	2		1	3		14	21		2	7	7	1.36	33%			10%
	Crucial		3	4		1		3	13	34	5	10	10	4.00	77%	2.37		38%
J. K.	Noncrucial		5	6		2		10	23		5	13	13	2.30	57%			22%
	Crucial	2	3	10		9	1	5	30	53	5	24	25	2.40	83%	2.36		17%
L. L.	Noncrucial		1	2		4		1	15	23		1	7	8	1.22	35%		4%
	Crucial	5	5	5		1	2	16	29	52	5	11	13	1.83	45%	1.56		17%
E. M.	Noncrucial		2	4		6		1	11	24		2	12	13	0.68	58%		8%
	Crucial	10	12			1	2	1	26	50	10	23	25	1.26	100%	0.98		38%
H. N.	Noncrucial		2	2		5		1	10	20		2	9	10	1.64	50%		10%
	Crucial	2	6	1		11	2	7	29	49	8	20	22	2.43	76%	2.11		28%
O. O.	Noncrucial	1	4	5		2		1	11	24		5	12	13	2.20	54%		21%
	Crucial	2	8	5		3	1	10	29	53	10	18	19	2.85	66%	2.56		34%
H. S.	Noncrucial		1			4		3	15	23		1	5	8	0.60	35%		4%
	Crucial	12	5			2	8	8	35	58	12	19	27	1.84	77%	1.35		34%
R. S.	Noncrucial		3	10		2		1	8	24		3	15	16	1.70	67%		12%
	Crucial	1	5	3		1	3	13	26	50	6	10	13	1.76	50%	1.73		23%
E. S.	Noncrucial		2			4			17	24		2	7	7	2.03	29%		8%
	Crucial	1	10	4		2	2	9	26	50	11	17	17	3.52	65%	2.80		42%
P. U.	Noncrucial		5	1		6		2	12	26		5	12	14	1.87	54%		19%
	Crucial	7	7	1		10		4	22	48	7	18	18	2.22	82%	2.03		32%
E. V.	Noncrucial	1	1	1				13	16		2	3	3	0.53	19%			12%
	Crucial	1	13	2		2	2	7	28	44	14	19	21	1.70	75%	1.27		50%
M. W.	Noncrucial		1	1		4		1	15	23		1	7	8	0.91	35%		4%
	Crucial	2	9	3		4	2	8	28	51	11	18	20	1.73	71%	1.36		39%
	Noncrucial	3	29	40		3	14	188	325		32	123	137	1.46				
	(weighted)													(1.48)				
Grand Totals	(weighted)	14	106	68		1	28	106	380	705	120	246	274	2.30	42%	1.88		10%
	(weighted)													(2.21)		(1.91)		32%

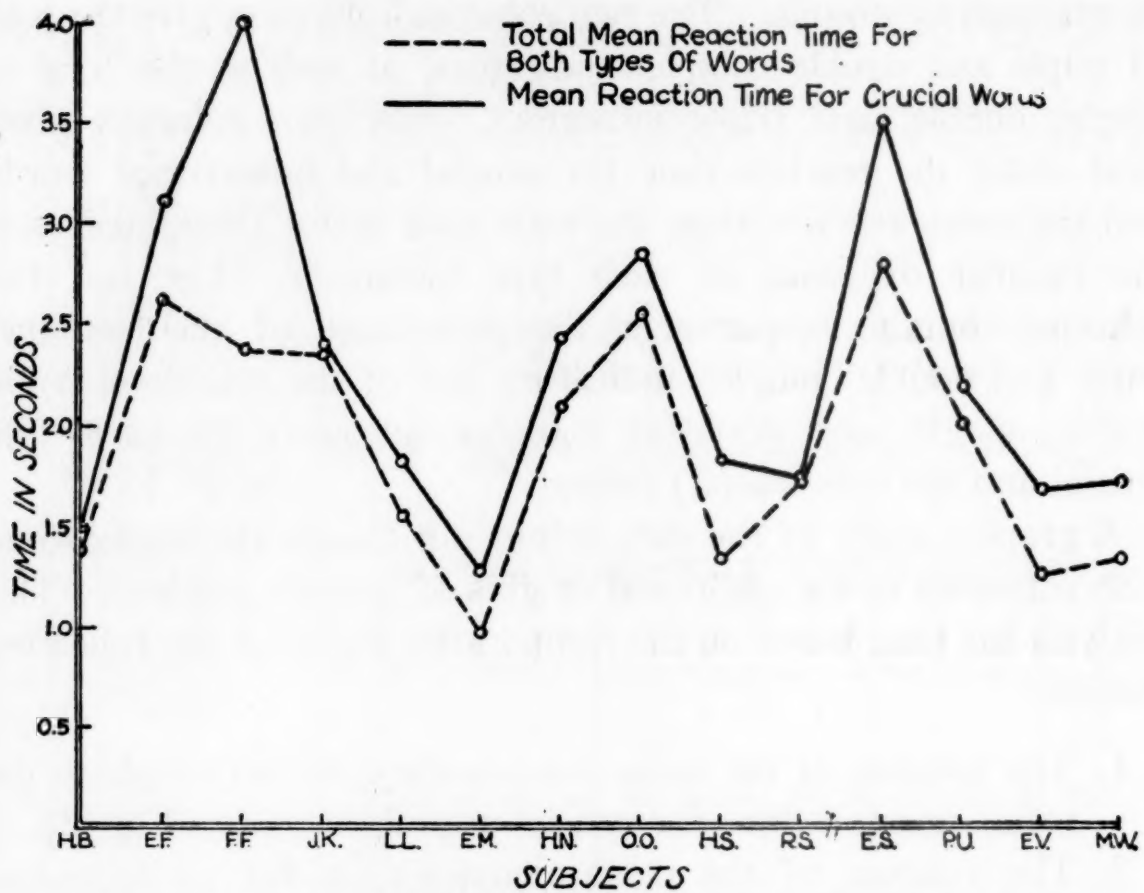
words used as stimuli. The two columns following give the total of triple and double complex-indicators, as well as the total of single, double, and triple indicators. The two columns given next detail the reaction-time for crucial and non-crucial words, and the mean reaction-time for each total series (weighted as to the number of cases of each type included). The last two columns contain, respectively, the percentage of the combined triple and double complex-indicators and of the combined triple, double, single, and doubtful complex-indicators, in each (the crucial and the non-crucial) series.

A graphic study of the data brings out clearly the implications with reference to the emotional origins of autistic gestures. This analysis has been based on the comparative study of the following factors:

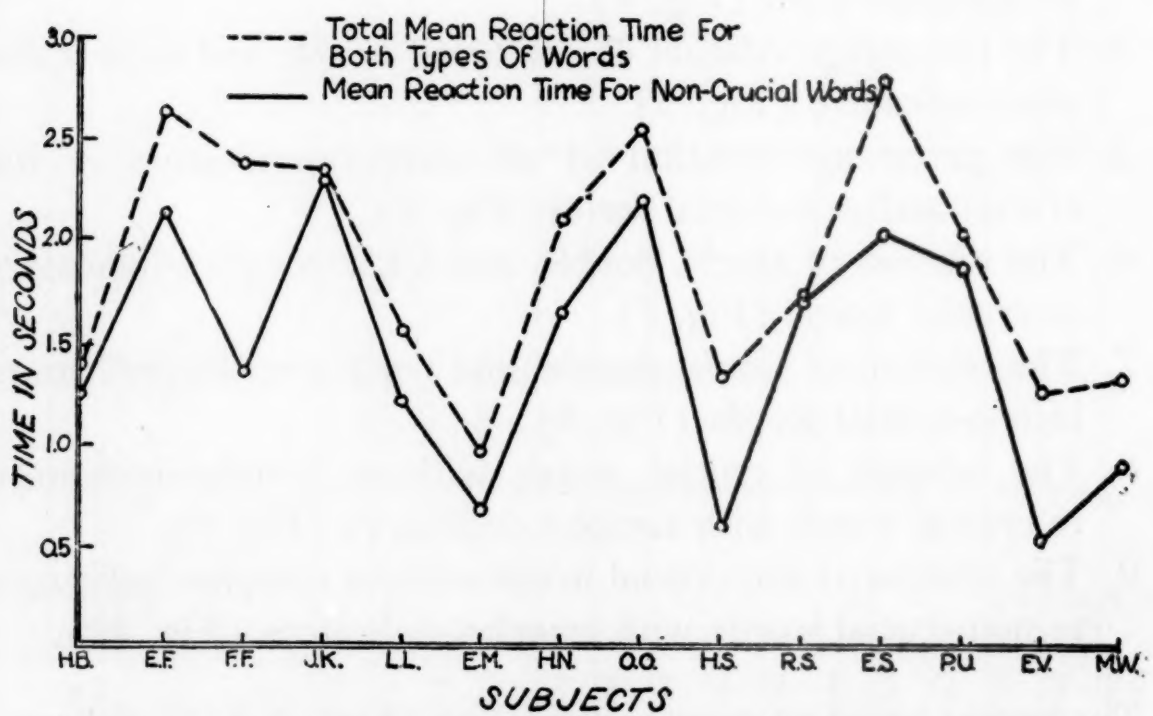
1. The relation of the mean reaction-time for all words to the mean reaction-time for crucial stimulus-words (Fig. 2).
2. The relation of the mean reaction-time for all stimulus-words to the mean reaction-time for non-crucial stimulus-words (Fig. 3).
3. The relation between the mean reaction-times for each type of stimulus-word (Fig. 4).
4. The percentage relation of combined double and triple complex-indicators (Fig. 5).
5. The percentage relation of all complex-indicators in the crucial and non-crucial series (Fig. 6).
6. The relation of single, double, and triple complex-indicators in crucial words (Fig. 7).
7. The relation of single, double, and triple complex-indicators in non-crucial words (Fig. 8).
8. The relation of crucial words without complex-indicators to crucial words with complex-indicators (Fig. 9).
9. The relation of non-crucial words without complex-indicators to non-crucial words with complex-indicators (Fig. 10).

The graphs based on reaction-time data (Figs. 2, 3, 4) indicate, first, that the average reaction-time for the crucial words significantly exceeds the average reaction-time for the entire series;





**Fig. 2.** GRAPH SHOWING RELATION OF COMBINED MEAN REACTION TIME FOR ALL STIMULUS WORDS TO MEAN REACTION TIME FOR CRUCIAL STIMULUS WORDS



**Fig. 3.** GRAPH SHOWING RELATION OF COMBINED MEAN REACTION TIME FOR ALL STIMULUS WORDS TO MEAN REACTION TIME FOR NON-CRUCIAL STIMULUS WORDS

that, conversely, the average reaction time for the non-crucial words is significantly below the average reaction time for the series; and, finally, the relation between the average reaction times for the crucial and the non-crucial series leaves little doubt as to whether this indicator favored the crucial words. The results are thus consistently in favor of the greater emotionality of responses to the specific (classroom) words.

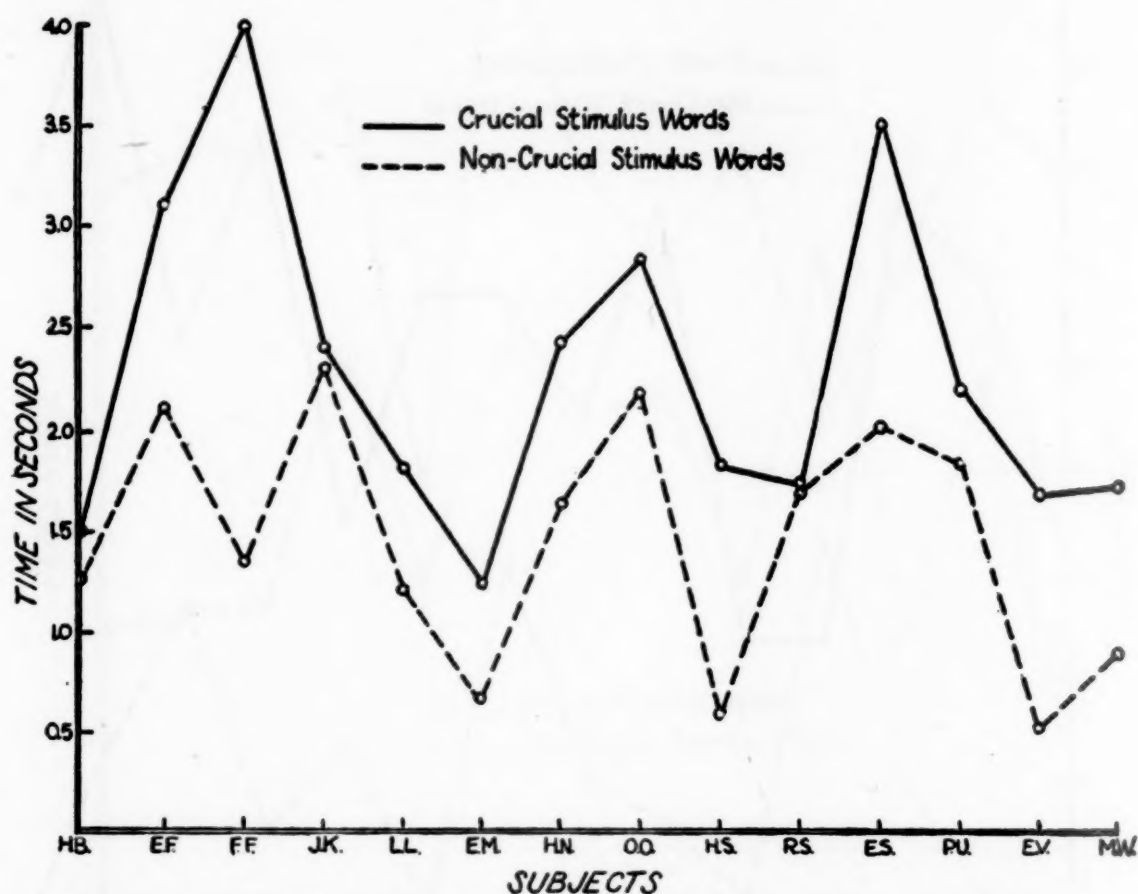


Fig. 4. GRAPH SHOWING RELATION BETWEEN MEAN REACTION TIMES FOR EACH TYPE OF STIMULUS WORD

A comparison of the absolute figures referring to the combined complex-indicators for the two types of words seemed inconclusive because of the inequality of the numbers involved, and in spite of the fact that it favored the crucials by considerable odds. However, a comparison on a percentage basis seemed indicated. Such a comparison, first, of the combined double and triple and, second, of all the various complex-indicators, showed again a definite preponderance of emotionally charged words among the crucials. In Fig. 5, based on the combined double and triple indicators, subjects J. K. and R. S. were the only exceptions

found; and of these, J. K., in the more exhaustive comparison based on the percentages of all complex indicators (Fig. 6), followed the general trend.

A comparison of the single, double, and triple complex-indicators within each series appeared worth making. This com-

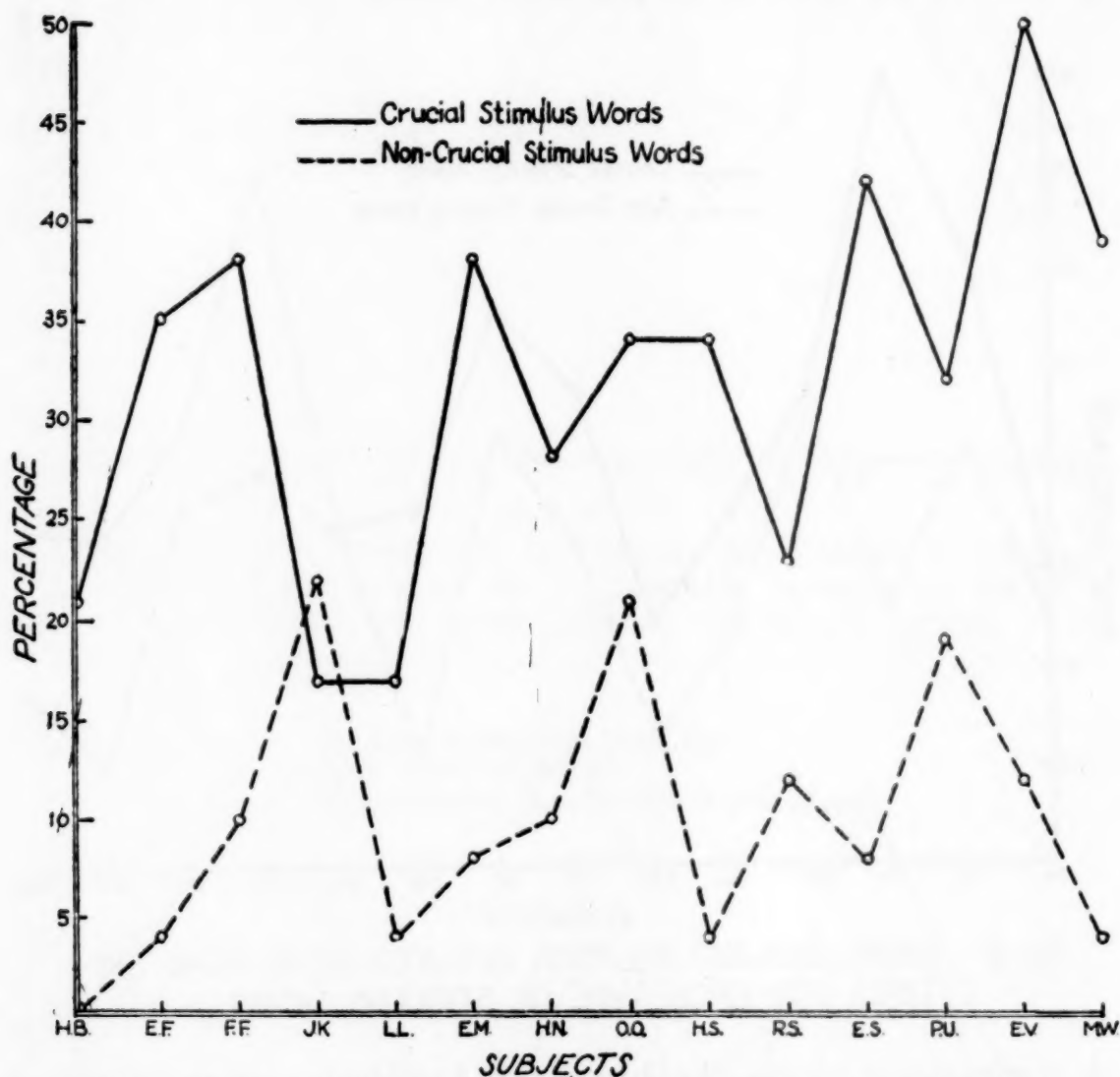


FIG. 5. GRAPH SHOWING PERCENTAGE RELATION OF COMBINED DOUBLE AND TRIPLE COMPLEX INDICATORS IN CRUCIAL AND NON-CRUCIAL SERIES

parison showed that, among the crucials (Fig. 7), the double-complex-indicators were approximately as numerous as the single-complex-indicators, while among the non-crucials (Fig. 8), the largest number of complex-indicators stood alone, and considerably above the next largest group—the double-indicators. Since the single-complex-indicators were obviously least reliable from



a diagnostic standpoint, it is interesting to note this difference also.

Of course, both the crucial and the non-crucial series contained complex-words and complex-free-words. In order to determine whether the first or the second series had a preponderance of

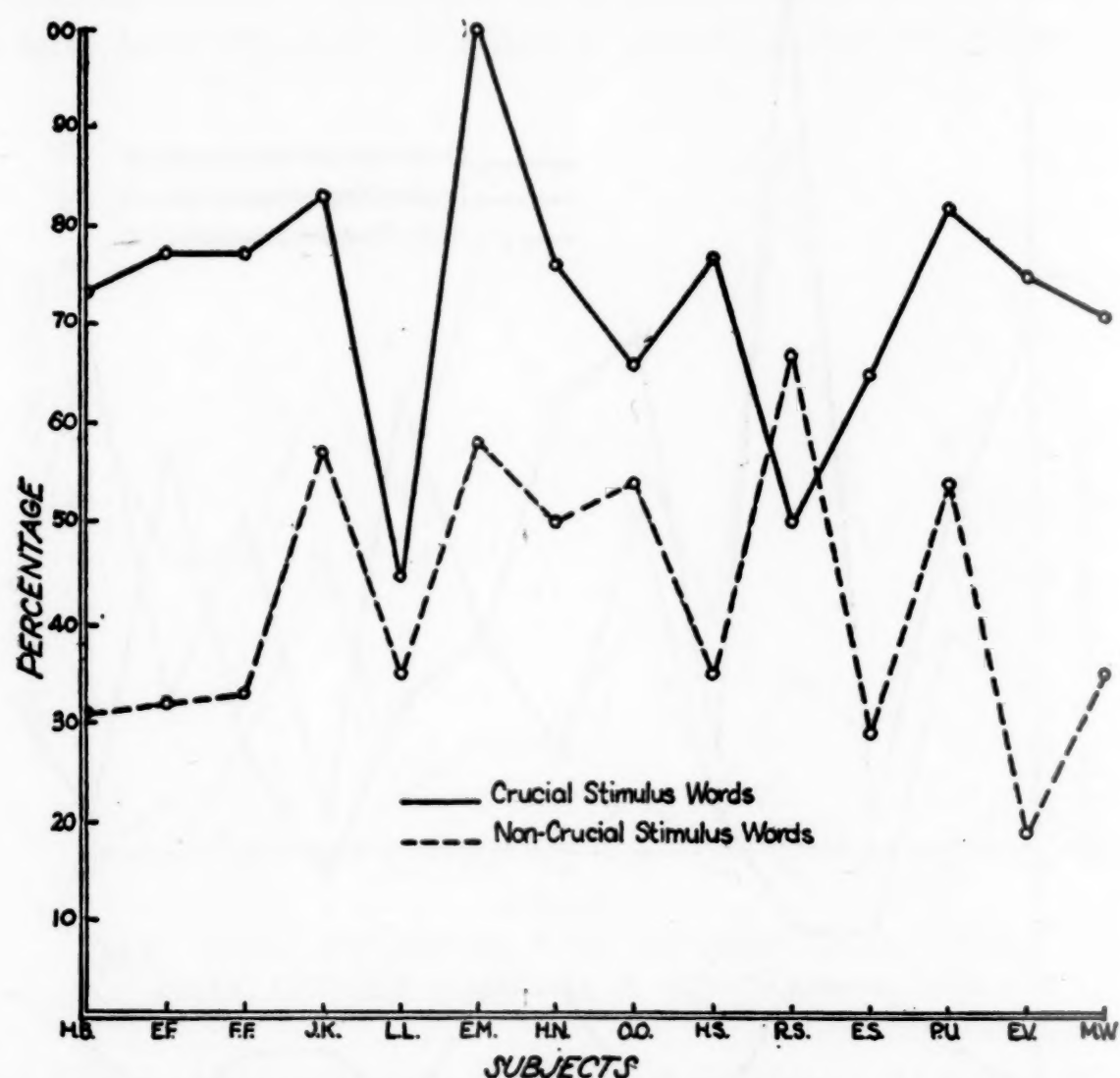
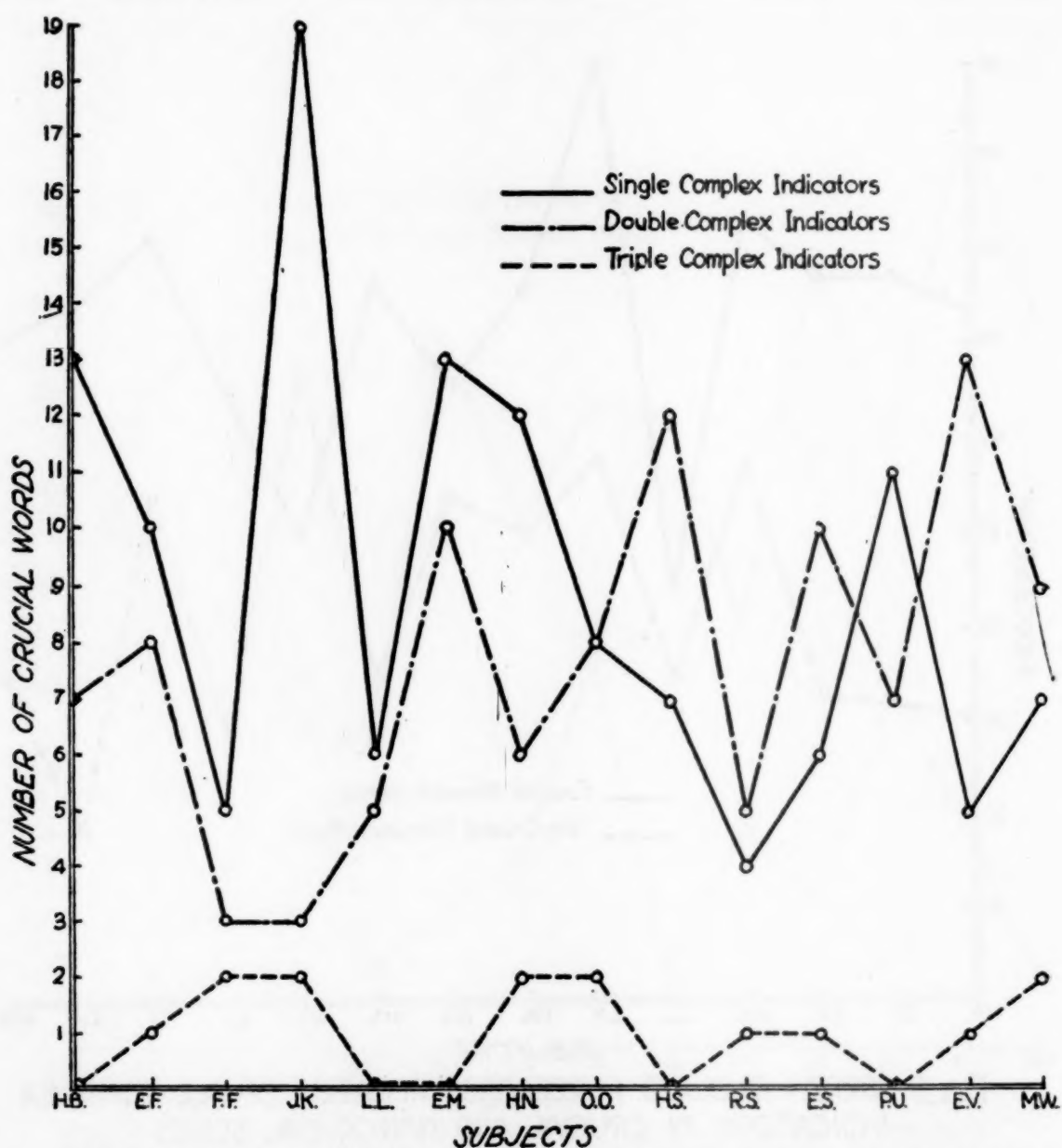


Fig. 6. GRAPH SHOWING PERCENTAGE RELATION OF ALL COMPLEX 'INDICATORS' IN CRUCIAL AND NON-CRUCIAL SERIES

either of these types of words, we have graphed relevant data, and obtained two graphs again confirming the hypothesis that the crucial words were much more likely to be emotion-charged than were the non-crucials (Figs. 9 and 10). It will be noted that there is an excess of non-complex over complex words in only two instances, the case of L. L. and that of R. S. In both of these, it will be found, the crucials exceeded the non-crucials by almost 50 per cent. However, in the non-crucial series

(Fig. 10) the chance nature of the distribution rather definitely points to the assumption that there were as many chances of a non-crucial word's being emotionally toned as there were of its being complex-free.



**Fig. 7.** GRAPH SHOWING RELATION BETWEEN SINGLE, DOUBLE AND TRIPLE COMPLEX INDICATORS IN CRUCIAL WORDS

Thus the data obtained in this experiment may be regarded as confirmatory of the hypothesis that the words preceding or seemingly accompanying gestural responses could be used to establish the emotional origins of these movements. There were a few shortcomings, however, that cast some doubt on the accuracy of our findings.

One of these shortcomings seemed to lie in the fact that we employed accessory factors (gestures) as indicators of emotionality. While Jung (19) and Luria (27) have established the principle that accessory responses are indices of emotional disorganization, nevertheless it appeared to us that, in checking the emotional content of associations, no diversions of any sort ought to have been included. We had to guard against the fallacy of

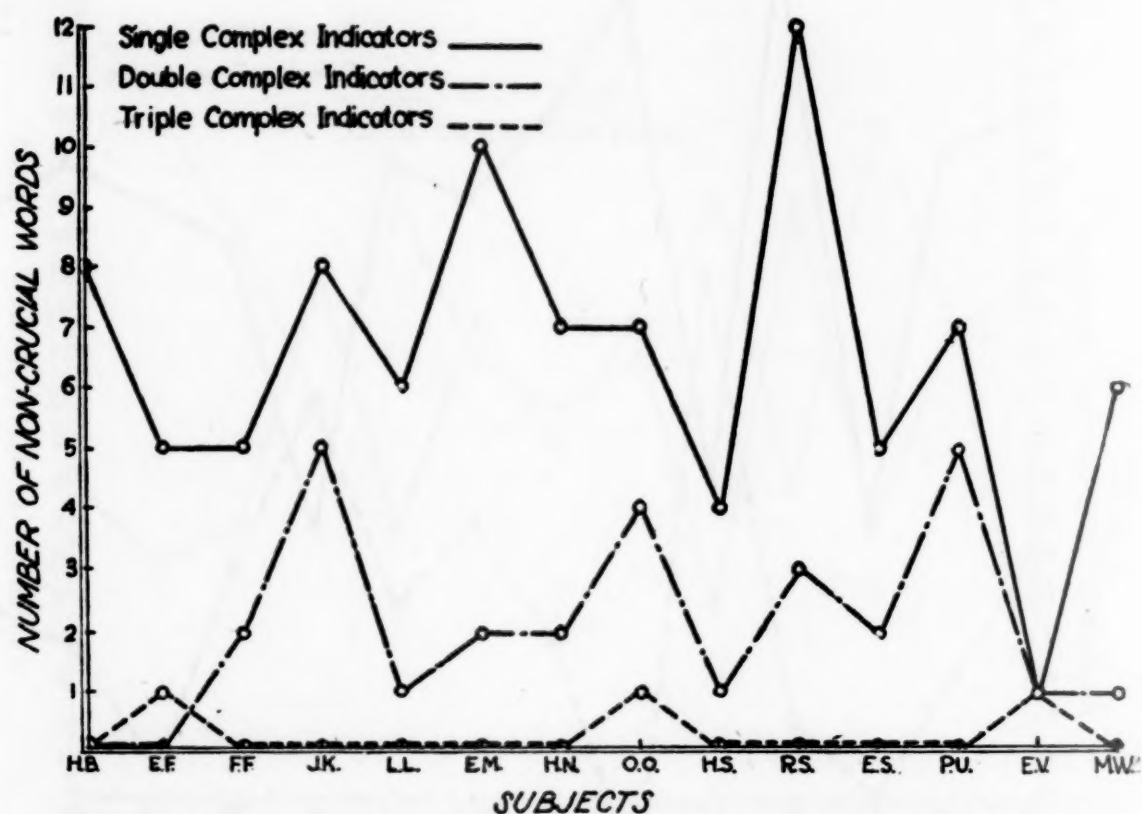


Fig. 8. GRAPH SHOWING RELATION BETWEEN SINGLE, DOUBLE AND TRIPLE COMPLEX INDICATORS IN NON-CRUCIAL WORDS

defining problem-factors in terms of themselves. It is true that, on including accessory movements, we obtained merely an accentuation of the aggregate results obtained by the more restricted method, since they alone could not determine the general trend of the series. Still, it was evident that we should not be proving the emotional basis of gestures if we took gestures as indicators of emotionality. The plan then was to discard them as indicators in future experiments on more or less theoretical grounds.

The matter of controlling the tests appeared more serious. Even though the control-words which we selected for comparison pointed to clear-cut differences, still it seemed barely possible that



other subjects might, when given the same word-series, similarly controlled, react in somewhat similar fashion. To obviate this possibility we might arrange to have the responses of an experimental subject balanced against those of a group of control-subjects. Another possibility was that, if a given arrangement of crucials and non-crucials given an experimental subject, at one

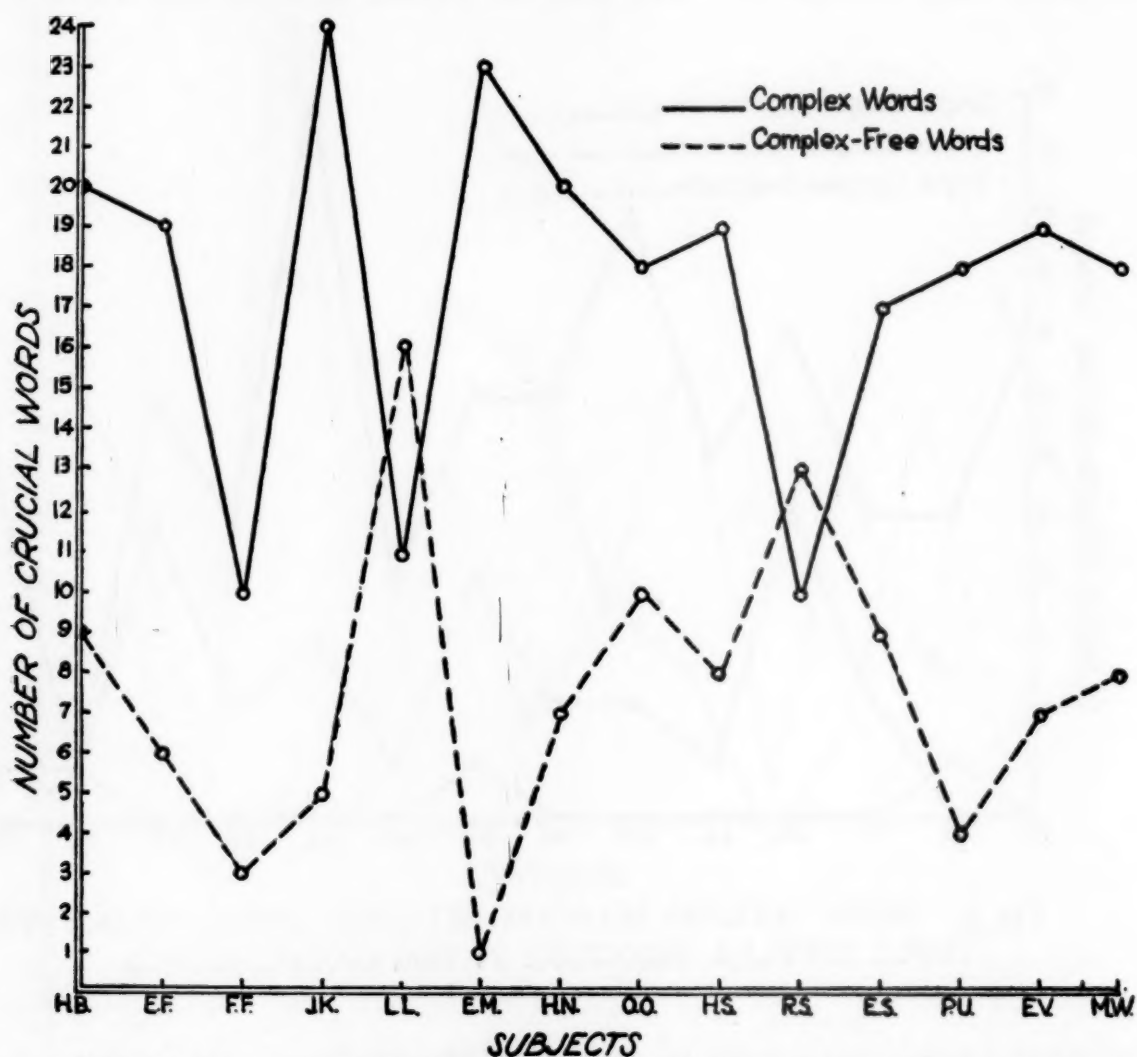
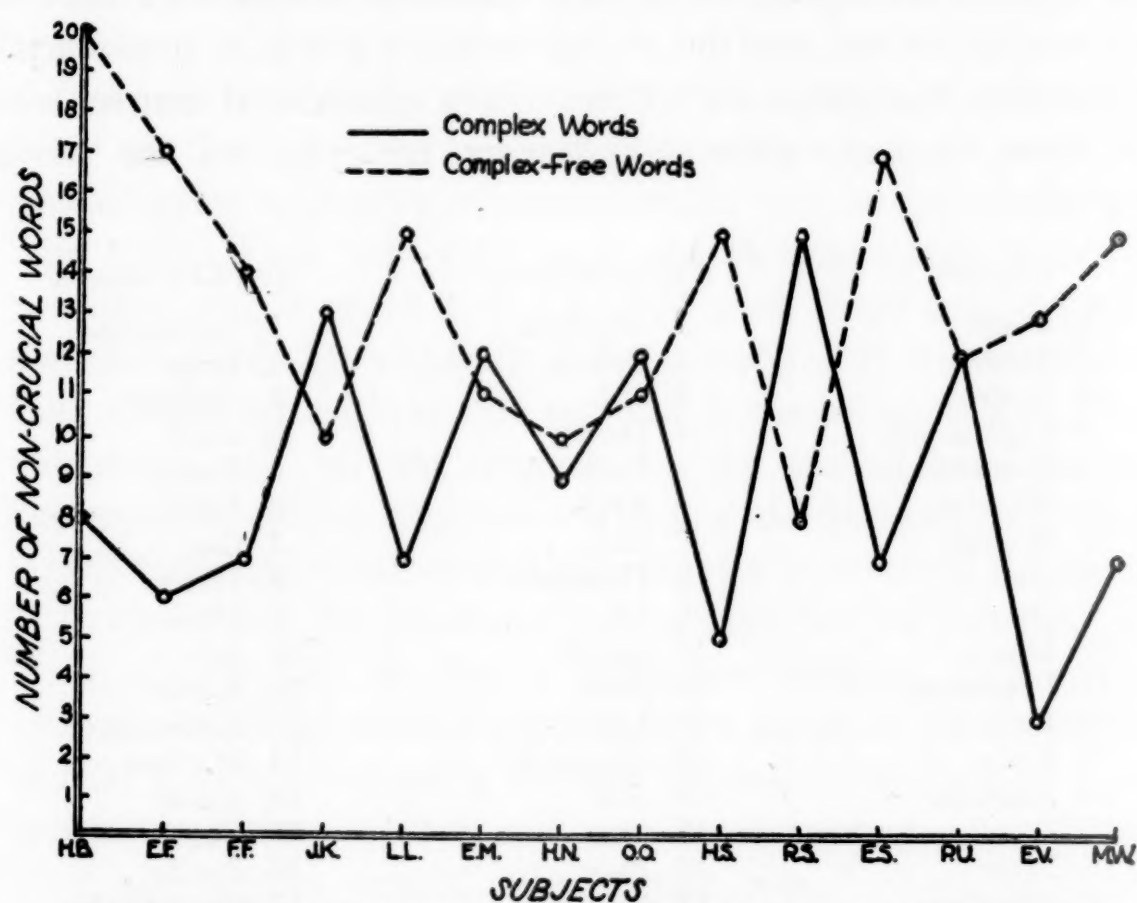


FIG. 9. GRAPH SHOWING RELATION OF CRUCIAL WORDS WITH COMPLEX INDICATORS TO CRUCIAL WORDS WITHOUT COMPLEX INDICATORS

time, were compared with his performance, on the same crucials and a different set of non-crucials, at another time, we might again get interesting differences. Both possibilities called for another series of experiments.

*Association studies with unselected control words.* From the preceding studies we have learned that by comparing the responses of a group of subjects to two sets of words—one of them crucial and the other selected for its relative indifference—we might

find that a greater emotional charge attaches to the first than to the second set. However, in a sense, we had prearranged or loaded our results by comparing the responses to the crucial words with responses to words known to be indifferent to a fair sample of a large urban population, in this country. Indeed, a later attempt to check on these results through the use of control subjects yielded somewhat different results. In these experi-



**Fig. 10.** GRAPH SHOWING RELATION OF NON-CRUCIAL WORDS WITHOUT COMPLEX INDICATORS TO NON-CRUCIAL WORDS WITH COMPLEX INDICATORS

ments it appeared advisable to make an intensive study of one individual on the basis of his or her gesture-stimuli and a corresponding number of neutral words, in order to establish the differences between (a) that individual's performances at various times and (b) that individual's performance, on the one hand, and the trend of the characteristic responses of a small control-group, on the other.

For the first experiment twenty-five words were recorded by an excellent observer, a student of art, who, after a period of training, was assigned the task of observing the experimental

subject in the classroom. The observer noted with precision both the gestures and the words apparently connected with them. A list of twenty-five neutral words was arranged from the first or second *common* words (*i.e.*, omitting such words as aam, Aardvark, etc.) appearing in Webster's Revised Unabridged Dictionary (1913 ed.), under each letter of the alphabet. This seemed closest to being a chance selection of control words of any scheme attempted. The *first* common words were used as non-crucials in one, and the *second* common words as non-crucials in the other test given the subject. The crucials, of course, were the same in both series. Following is a list of the words employed.

<i>Crucials</i>	<i>Non-Crucials—I</i>	<i>Non-Crucials—II</i>
1. Gland	1. Abandon	1. Abbreviate
2. Mother	2. Babble	2. Baby
3. System	3. Cab	3. Cabbage
4. Contraction	4. Dabble	4. Daily
5. Overactive	5. Each	5. Eager
6. Muscles	6. Fable	6. Fabric
7. Woman	7. Gab	7. Gag
8. Duct	8. Hammer	8. Habit
9. Died	9. Ice	9. Ideal
10. Men	10. Jackal	10. Jail
11. Beginning	11. Keen	11. Kaiser
12. Evoke	12. Label	12. Laboratory
13. Body	13. Macaroni	13. Machine
14. Stimulus	14. Nab	14. Naïve
15. Emotional	15. Oak	15. Oar
16. Liver	16. Pace	16. Pacific
17. Primitive	17. Quack	17. Quadrangle
18. Work	18. Rabbit	18. Race
19. Puzzling	19. Sabbath	19. Sack
20. Unconcerned	20. Tarnish	20. Table
21. Nodules	21. Ugly	21. Ultimate
22. Unusual	22. Vacancy	22. Vagabond
23. Believe	23. Wabbly	23. Wafer
24. Stupid	24. Yacht	24. Yankee
25. Connection	25. X-ray	25. Zeal

From Table 12 it will be observed that our subject, A. B., did somewhat differently on the two tests. The results on the *first* test are in keeping with the results on the previous group-experiment. We find that but 8 per cent of the non-crucials contained two- or three-complex-words, whereas 48 per cent of the crucials contained such words. Taking the complex-words in the aggre-



gate, we find that in the non-crucial series 60 per cent were such words, while in the crucial series as many as 80 per cent had complex-indicators of some sort. The results in regard to association and reproduction time are also positive. We find, as we might expect, the reaction time (association and reproduction) significantly larger for the crucials than for the non-crucials. Similarly, we find the mean reaction-times, for the total number of words, larger than in the non-crucials, but smaller than in the crucials.

Now we turn to the results of A. B.'s second test (Table 12). Here we find again the percentage of complex-words in the non-crucial series to be proportionately lower than in the crucial series. The ratio, if we take only two- and three-complex words into consideration, is about 2:3 (36:52), and, if we consider all the complex-words, it is exactly 2:3 (64:96). It will be observed that, in spite of a 16 per cent increase in the percentage of all-type complex-words for the crucials in the second test, the ratio between the crucial complex-words and the non-crucial complex-words remained constant and significantly in favor of the crucials.

In examining the reaction-time averages for the two tests given A. B. (Table 12) we find a significant increase (1.2 seconds) in non-crucial association-time, a slight decrease (0.4 second) in crucial association-time, a marked increase (0.8 second) in non-crucial reproduction-time, and an almost corresponding decrease (0.7 second) in crucial reproduction-time. There is a small increase (0.4 second) in total average association-time, but no significant (only 0.1 second) difference in the total average reproduction-time for the two tests. It is important to observe that, in total average reaction-times, there is virtually no difference between the two tests, either for association- or for reproduction-time.

The decrease in the reaction time to crucial words seems to be coterminous with an increase in noncrucial reaction-times, and, incidentally, with an increase of the percentage of two- and three-complex words in the non-crucial series. It must be repeated that, whereas the crucial series remained the same in the two tests, the non-crucial lists varied. In the crucials our problem

TABLE 12  
RELATIVE VALUES OF CRUCIAL AND NON-CRUCIAL STIMULUS-WORDS AS DETERMINED BY ASSOCIATION TESTS WITH CONTROL SUBJECTS

Subjects	Type of Stimulus Word	A	B	C	D	E	F	G	H	I		J	K	L
		Three or More Complex Indicators	Two Complex Indicators	One Complex Indicator	No Complex Indicator	Number of Stimulus Words of Each Type	Total Number of Stimulus Words	Total of Three and Two Complex Indicators	Total of Three, Two and One Complex Indicators	Mean Reaction Time for Each Type (in seconds)		Total Mean Reaction Time (in seconds)	Percent of G to E	Percent of H to E
										Association	Reproduction			
A. B. I	Noncrucial Crucial	0 6	2 6	13 8	10 5	25 25	50	2 12	15 20	1.8 3.5	3.6 4.7	2.6 4.1	8% 48%	60% 80%
A. B. II	Noncrucial Crucial	3 6	6 7	7 11	9 1	25 25	50	9 13	16 24	3.0 3.1	4.4 4.0	3.0 4.2	36% 52%	64% 96%
Average for A. B.	Noncrucial Crucial	1.5 6	4 6.5	10 9.5	9.5 3	25 25	50	5.5 12.5	15.5 22	2.4 3.3	4.0 4.3	2.8 4.2	22% 50%	62% 88%
C. D.	Noncrucial Crucial	4 7	6 8	3 8	12 2	25 25	50	10 15	13 23	4.5 4.6	7.1 6.5	4.5 6.8	40% 60%	52% 92%
J. T.	Noncrucial Crucial	7 5	5 5	5 11	8 4	25 25	50	12 10	17 21	1.7 2.9	8.7 5.2	2.3 6.9	48% 40%	68% 84%
L. O.	Noncrucial Crucial	2 4	4 7	5 10	14 4	25 25	50	6 11	11 21	2.5 2.3	3.0 4.9	2.4 3.9	24% 44%	44% 84%
J. C.	Noncrucial Crucial	4 5	7 11	7 7	7 2	25 25	50	11 16	18 23	1.8 1.9	2.3 3.9	1.8 3.1	44% 64%	72% 92%
G. O.	Noncrucial Crucial	1 5	4 3	10 11	10 6	25 25	50	5 8	15 19	2.9 4.1	2.6 4.6	3.5 3.6	20% 32%	60% 76%
Average for Controls	Noncrucial	3.6	5.2	6	10.2	25	25	8.8	14.8	2.7	4.7	2.9	35%	59%
Average for A. B.	Noncrucial	1.5	4	10	9.5	25	25	5.5	15.5	2.4	4.0	2.8	22%	62%
Average for Controls	Crucial	5.2	6.8	9.4	3.6	25	25	12	21.4	3.2	5.0	2.9	48%	86%
Average for A. B.	Crucial	6	6.5	9.5	3	25	25	12.5	22	3.3	4.3	2.8	50%	88%

would be to explain the lessened affectivity of the stimuli, while in the non-crucials we merely have to point out why a different stimulus-series should evoke greater affectivity than another series had evoked.

We are not here primarily concerned with the difference in the responses of our subject to the non-crucial lists. Still, the uniform increase of reaction-time and multiple-complex words can be explained. Indeed, we were far from expecting that a new list of non-crucials would necessarily yield the same affectivity-score as had another list. But since the change was in a uniformly positive direction, we may find a suitable explanation in the principle that association generally is a function of attention or posture set. The fact that, in the second test (given one day later than the first) the subject showed increased affectivity in responding to the *unfamiliar* non-crucials, may be attributed to the relative novelty of these stimulus-words, requiring a "heightened attention state" or a sudden shift in postural tonus, when followed or preceded by *familiar* crucial words. Hence, we may assume that the increase of multiple-complex words in the non-crucials, and the increase in association- and reproduction-time, was due to the *relative* novelty of the stimulus-words.

If the increase in the non-crucial multiple-complex words, and the reaction-times of non-crucials, can be explained on this basis, then the decrease in A. B.'s reaction-times, in the crucial series, may be explained, conversely, on the grounds of decreased tension in the responses of the subject to the familiar crucial words. This, indeed, is supported by the published findings of psychologists (47), proving that the value of the association technique in measuring affectivity diminishes with practice, and, hence, a given word-series may be expected to yield, in repeated tests, the type of scores which we have obtained in this case.\*

The experiment in question has aimed to test the specificity of the emotional value of certain crucial words. We may say that it has established the fact of specificity somewhat less conclusively

\* Another factor, at the time unexplained (see next section of this chapter), but related to the differences in the two tests given our subject, was the fact that the first test had been administered by an assistant, while the second was administered by the writer himself. Later experiments controlled this variable.



than might have been expected because of the complications introduced by the practice-effects of the crucials used four times in two tests (association and reproduction), and because of the relatively high competition-value of the non-crucials in the second test.

If we go by the general distribution of complexes in the two tests given A. B., we may say that it substantiates the findings of the original group-association experiments. In the present experiment, however, we have gone beyond the findings of the previous experiment, in that we have here established the constancy of the total average (all-type) complex-words in the two tests, for the crucial series. In spite of the complications, this finding proves beyond peradventure that crucial words causally related to gestural responses have, for the individual concerned, a relatively constant emotional value.

*Association studies with control subjects.* In these experiments we used the results of the previous experiment, adding, for comparative purposes, the data obtained on five controls. The experimental subject, A. B., was a young woman, nineteen years old, born in a mid-western city, and having sophomore standing in a liberal arts course. The controls were three young women and two young men. All the subjects were less than twenty years old, college sophomores, following the liberal arts course, and born in large mid-western cities. They were all members of the same class in psychology. To some extent, then, the major factors involved were standardized.

While the data, as in the previous experiment, are not sufficient for correlation purposes, they do present a clear-cut picture in tabular form. In the upper section of Table 12, the comparison made is between the first and second experiments involving A. B.; in the middle section of this table the data given refer to the five controls; and, in the lowest section, the comparison offered is between the average performance of A. B. and the averages of the controls, in both the crucial and the non-crucial series.

Examining Table 12, we find some interesting facts in regard to our complex words. Taking the double- and triple-complex

words, we observe that, in the non-crucial series, A. B. had but 22 per cent, while the controls registered 35 per cent. This would seem surprising, were it not for the fact that, in the second experiment, A. B. registered 36 per cent of non-crucial complex-words, a percentage almost exactly similar to that of the controls. Even more interesting, however, is the comparison between our all-type non-crucial complex-groups. We find that here A. B. scored only slightly more than the controls, her score being 62 per cent, and that of the controls 59 per cent. It may be noticed that, in her first experiment, she also had a score of 60 per cent, thus coming very close to the control average. On the whole, then, we might say that, in regard to the non-crucials, the experimental subject and the controls had performed similarly.

Comparing percentages of double- and triple-complex-words (column K, Table 12) among the crucials with the corresponding percentage in the non-crucials *among the controls*, we find a difference of only 13 per cent (48% minus 35%) in favor of the crucials. In comparing the same percentages *in the case of A. B.*, we find a difference of 28 per cent (50% minus 22%) in favor of the crucials. This might be deemed an important index of excessive emotionality of crucial words in the case of the experimental subject. However, a comparison of all-type-complex percentages (column L, Table 12) along the same lines, points to virtually absolute similarity between the percentage of complexes among the crucials and the percentage in the non-crucials, for A. B. and the controls; being 27 per cent (86% minus 59%) *in the case of the controls*, and 26 per cent (88% minus 62%) *in the case of A. B.*

Furthermore, examining the crucial series more closely, we discover that the controls, who averaged 86 per cent of all-type complex-words, had almost the same average number of all-type complex-words as the experimental subject, who averaged 88 per cent on the two tests given her. In view of the fact that there was no significant difference in the excess percentage of crucials over non-crucials between A. B. and the controls, and further, because A. B. had virtually the same total percentage of complex-words as the controls, we must conclude that the emotional



specificity of our crucial words, so far as these data are concerned, has not been established.

In examining the results in regard to mean reaction time as given in Table 12, we find a situation not much different from that obtained in the study of the complex-composition of the data. A. B.'s association-reaction-time shows considerable variation, expressed in a difference of 0.4 second for the two experiments; while the times for the controls show a variability range of 2.7 seconds. In reproduction-time, A. B.'s variability range is merely 0.1 second, while that of the group is 3.7 seconds. This would seem to indicate that in spite of the uniformities found in the control subjects, we really had an unselected group.

It is important to note the differences existing between the individual performances of the controls and the average performance of the control group. In comparing the mean association-reaction-time for the individual controls in the crucial and non-crucial words, we find that in only one case (L. O.) does the association-reaction-time for the non-crucials exceed that for the crucials, and then by only 0.2 of a second. In examining the mean reproduction-reaction-times for the individual controls, we find two exceptions (C. D. and J. T.) to the general trend in favor of the crucial words.

Even more important for our purposes is a comparison of the average performances of the control group with the performance of A. B. As regards non-crucial association-time, we find A. B. to be slightly more efficient (2.7 seconds as against 2.4 seconds) than the control group. As regards crucial association-time, however, A. B. is slightly less efficient (3.2 seconds as against 3.3 seconds). It may well be asked, however, whether the non-crucial differential (the difference between A. B.'s average and that of the control group) ought not to be added to A. B.'s *crucial* reaction time average, on the assumption that this differential is constant for both series. Were we to add the 0.3 (2.7 minus 2.4) differential to the crucial reaction-time of A. B., we should find not that the difference between the crucial association-time of A. B. and that of the control group is diminished, but that the difference is increased in favor of A. B.



We find the situation to be similar in regard to reproduction-time. The non-crucial average is 0.7 second higher here for the controls than for A. B. The difference between the crucial times of A. B. and the controls is, however, markedly in favor of the controls. A. B., in other words, took less time to reproduce the non-crucial words, but she also took less time to reproduce the crucials; and the differential is again such that, were it added to A. B.'s reproduction-time average, it would make the reaction times of subject and controls at least equal to each other. The same conclusion holds naturally for the total mean reaction times, in both series, for A. B. and for the controls.

Thus no conclusive results can be said to have been obtained in this experiment. While the complex-count and the reaction-times showed a clear-cut distinction as between the responses to non-crucial and those to crucial stimulus-words, we can not say that gestural stimuli possess distinctive emotion-producing value for the reason that the experimental subject and the control group showed *the same* relative differences in responding to the two word-series. In order to explain this phenomenon, we might reconsider the procedure from the point of view of (a) the words used as controls and (b) the relation of the words to the setting from which they had been selected.

The non-crucial words selected from the dictionary did not wholly remove the objections which we previously expressed to the Kent-Rosanoff control-words. Fundamentally, they were so much more familiar, and so much more commonplace, than the specific words collected in the classroom that they were probably less disturbing to the subjects—experimental and control alike. The greater familiarity of the classroom words, and their greater difficulty, might in turn be traceable to certain factors inherent in the classroom situation.

There is a possibility that some type of parent-child relation is reenacted in the classroom. If so, the gestures produced might refer to preëxisting emotional situations, and so be diagnostic of preëxisting complexes. However, the words to which the teacher introduces the student in the classroom have emotional value because of the restraint characteristic of the classroom. Thus

the classroom words used as stimuli possess emotional significance regardless of whether they set off previous complexes or not. It seemed probable that, for this reason, the results obtained in the preceding experiment were non-conclusive. The subject and the controls had been members of the same classroom situation, and they were equally likely to respond emotionally to the majority of the crucial words earmarked "From the classroom."

The results obtained did not invalidate the findings of the two preceding experiments, but they called for an experimental interpretation of the behavior of the control-group. Now evidently the test lay in devising a set-up which would eliminate the effect of the classroom situation by keeping it constant, in the case of both subjects and controls, for both crucial and non-crucial words.

*Association studies with parallel groups and unselected control-words.* In arranging an experiment which would be more carefully controlled with regard to the effect of the classroom situation, we adopted three significant changes in technique. First, the subjects were not volunteers but persons selected at random from among the students in an advanced psychology class. The intention here was to eliminate the factor of emotionality contingent on the classroom situation as such. Second, the subjects were divided into two parallel groups for one of which the supposed gesture-stimuli were specific, and for the other, presumably, no more important than any other word used in the classroom. The intention here was to obviate the comparison of individual cases, and to rely more definitely on central tendencies. Third, the non-crucial words were chosen from the words employed in the classroom, other than those to which the experimental subjects had presumably gestured. It seemed probable that, if both the crucials and the non-crucials could be derived from the same general situation, the factor of emotionality due to the classroom "atmosphere" would thus be kept, statistically, under control.

Nine students—six subjects and three controls—participated in this experiment. Neither the subjects nor the controls knew the purpose of the experiment, and they were uninformed as to the time at which it began or the time at which it ended. Two observers were assigned to each subject. Our crucial words



TABLE 13  
RELATIVE VALUES OF CRUCIAL AND NON-CRUCIAL STIMULUS-WORDS, AS DETERMINED BY ASSOCIATION TESTS WITH PARALLEL GROUPS AND UNSELECTED WORDS

Subjects	Type of Stimulus Word	A B C D E F G H I J K L													
		Three or More Complex Indicators	Two Complex Indicators	One Complex Indicator	No Complex Indicator	Number of Stimulus Words of Each Type	Total Number of Stimulus Words	Total of Three and Two Complex Indicators	Total of Three, Two and One Complex Indicators	Mean Reaction Time for Each Type (in minutes)		Total Mean Reaction Time (in minutes)	Percent of G to E	Percent of H to E	
										Association	Reproduction				
Experimentals															
L. L.	Noncrucial	2	1	5	2	10	20	3	8	0.37	0.44	0.36	0.43	30%	80%
	Crucial	4	2	3	1	10	20	6	9	0.36	0.42			60%	90%
I. G.	Noncrucial	5	0	3	2	10	20	5	8	0.33	0.45			50%	80%
	Crucial	5	3	2	0	10	20	8	10	0.52	0.35	0.42	0.40	80%	100%
C. B.	Noncrucial	2	3	3	2	10	20	5	8	0.84	0.50			50%	80%
	Crucial	5	1	1	3	10	20	6	7	1.55	0.55	1.19	0.52	60%	70%
A. M.	Noncrucial	5	2	1	2	10	20	7	8	0.37	0.64			70%	80%
	Crucial	4	3	1	2	10	20	7	8	0.33	0.41	0.35	0.52	70%	80%
E. B.	Noncrucial	5	1	2	2	10	20	6	8	0.54	0.61			60%	80%
	Crucial	5	2	3	0	10	20	7	10	0.53	0.75	0.53	0.68	70%	100%
G. G.	Noncrucial	2	2	0	6	10	20	4	4	0.41	0.58			40%	40%
	Crucial	6	1	2	1	10	20	7	9	0.43	0.88	0.42	0.73	70%	90%
Controls															
H. A.	Noncrucial	5	3	1	1	10	20	8	9	0.49	0.64			80%	90%
	Crucial	10	1	6	3	20	30	11	17	0.48	0.58	0.48	(weighted) 0.60	55%	85%
D. S.	Noncrucial	6	2	1	1	10	20	8	9	0.36	0.52			80%	90%
	Crucial	5	4	3	8	20	30	9	12	0.35	0.48	0.35	(weighted) 0.49	45%	60%
N. R.	Noncrucial	4	1	1	4	10	20	5	6	0.41	1.03			50%	60%
	Crucial	8	5	5	2	20	30	13	18	0.53	0.93	0.49	(weighted) 0.96	65%	90%
Averages															
Experimental Subjects	Noncrucial	3.5	1.5	2.3	2.7	10	20	5	7.3	0.48	0.54	0.54	0.55	50%	73%
	Noncrucial	5	2	1	2	10	20	7	8	0.42	0.73	0.44	0.68	70%	80%
Experimental Subjects	Crucial	4.8	2	2	1.2	10	20	6.8	8.8	0.62	0.56	0.54	0.55	68%	88%
	{(weighted) Crucial	(3.8) 7.7	(1.7) 3.3	(2.3) 4.7	(2.2) 4.3	20	30	(5.5) 11	(7.8) 15.7	0.45	0.66	0.44	0.68	55%	78%



were, again, those which had been recorded by both observers. Two assistants, unconcerned with the experiment, were assigned the task of collecting words heard in the classroom during the period of observation. These words were employed as non-crucials, so long as they did not agree with any words on the observers' lists. There were ten words of each kind included in the test given the experimental subjects. For the controls we used twenty crucials ("belonging" to two experimental subjects), and ten non-crucials. The same non-crucial words were used for each person tested. The order of the association word-series was uniformly *abbaba*.

As regards the entire range of complex-indicators we find that the results, in Table 13, are less clear when case-by-case comparisons are made than when percentages are used. There are, in the data for the experimental subjects, four out of six cases in which the crucial series outweighs the non-crucial, one case in which the non-crucial outweighs the crucial, and one case in which they are evenly balanced. The case of C. B., wherein the non-crucial complexes exceed the crucial, is marginal to our other findings because the subject was reported to have been uncoöperative, if not antagonistic, in the course of the test. In the control-series the situation is, as might have been expected, inconclusive. In one case the crucials exceed the non-crucials, in another the opposite is the case, and in the third, the two sides are virtually balanced. Evidently, then, we must resort to percentage data (correlation being inadvisable with a small number of cases) for our conclusions.

In the percentage-data, derived from the computation of the relationship between the combined double- and triple-indicators to the total number of stimulus-words, the trend is much more definite. Thus we find, in comparing the percentages of all complex-indicators, *i.e.*, the total number of triple-, double-, and single-indicators divided by the number of stimulus-words of each type (H/E, in Table 13) that there is a closer similarity between the percentage of complexes in the non-crucial words than there is in the crucial words of the two groups of subjects. This relationship is evident; though, of course, less so, when we

compare the double- and triple-indicators only (G/E, in Table 13) for the two groups. Even more marked are the results when we compare the difference in percentages, as between the crucials and the non-crucials, in the case of the experimental subjects and in that of the controls. In the latter, considering all complex-indicators, again, we find virtually no difference (eighty per cent as against seventy-eight per cent) between the crucials and the non-crucials. In the experimental subjects, however, we note a difference of fifteen per cent (seventy-three per cent for the non-crucials and eighty-eight per cent for the crucials). Considering the fact that, for the experimental subjects, the gesture-words had relatively greater emotional value, this is at least noteworthy. The significance of this finding is enhanced by the failure of one subject to coöperate, and the fact that the results for the non-crucials were overdetermined by their relatively larger number (twenty as against ten).

As regards reaction time, we may say that a comparative curve would not yield a clear-cut picture of the actual findings in Table 13. Here again the fallacy of individual comparison emerges from the data. The crucial and non-crucial reaction-times, for both association- and reproduction-times, when compared with the respective mean reaction-time values, show as many cases in which the crucials exceed the mean time for all the words as there are of those in which the non-crucials do so. When average reaction-times for the entire group are sought, however, we secure results more nearly in accord with expectations. Non-crucial association-time, we find, is higher for the experimental than for the control group (0.48 as against 0.42), which is important only insofar as it gives us a differential (0.06) to be remembered in comparing the reaction-times of the two groups in regard to the *crucial* words. In doing so, we discover that—with the differential added to the mean association-time of the control group (0.45 plus 0.5)—we still get a difference of 0.12 minute between the subjects and the controls, on the crucial words. Now, in comparing the average association-time of the controls for the two types of words, we find virtually no difference (0.42 minute as against 0.45 minute). On the other hand,



when comparing the association-time averages for the experimental subjects, we get a difference of 0.14 minute (0.62 minus 0.48), in favor of the crucials.

In studying the average reproduction-times of the two groups we get data which are somewhat puzzling. The indications here are that the controls took more time than did the other subjects, on the average, for the reproduction of non-crucial words (0.55 as against 0.73 minute), and also took more time to reproduce the crucials (0.56 as against 0.66). The latter difference, which is of especial importance to us, is removed, and changed in favor of the experimental subjects, when we utilize, as in previous instances, the 0.2 control-word differential (0.73 minus 0.54 minute). Further study of the average reproduction time for both experimental subjects and controls shows a difference of 0.07 (0.73-0.66) in the non-crucials, in favor of the *controls*, and also a difference of 0.02 (0.56-0.54) for the crucials, in favor of the *subjects*. Since only the crucials were specific for the subjects, we may discount the findings relative to the non-crucials, and conclude that the data on reproduction-time, as a whole, favor our general hypothesis.

Thus the experiment does not disprove the fact that non-crucial words, borrowed from the classroom situation, also possess emotional value; but it does prove that the specific emotional manifestations consequent upon the appearance of crucial words does not necessarily depend upon the classroom situation as such. It may be relevant to add that, even if the data showed classroom words of any variety (whether gestured to or not) to be emotionally toned, it would still be possible to show that those words are emotionally toned because of previous conflicts, for which the classroom situation and the words heard in the classroom serve as "prepotent cues." Of course this could not disprove the fact that the so-called gesture-words possess emotional significance.

Evidently we had too few subjects and too many crucial words, by comparison. Another difficulty derived from the fact that the crucials and the non-crucials had to be obtained from a situation (the classroom) which, in any case, might evoke emotional responses. Relying, however, on the results obtained from the



complex-analysis of the crucial and non-crucial word-stimuli, and especially the association-reaction-times, in the various preceding experiments, we may conclude that the words we have termed *crucial* did possess emotional value for the persons whose gestures were recorded. To establish the latter point more fully we have resorted to an intensive study of case material.

*Studies in case material.* Through the association-test experiments we have obtained evidence in favor of the hypothesis that gestures are signs on conflict. We have also been able to demonstrate that when a gesture occurs in response to a given word, that word may be regarded as a cue to an existing emotional tension. We may assume the reason for this to be the fact that a stimulus-word, acting as a catalytic agent, heightens (without changing its own essence) the existing tension, and thus raises an inhibited impulse to the level of overt muscle action. This assumption, however, needs further checking. With the view to this end we have organized the case material obtained from the subjects (with one exception) who had been asked to observe and attempt to interpret the origins of their autistic gestures (*vide* Ch. 3).

The only case not connected with our previous experiments is that of a child who demonstrated by a certain gesture that a motor-movement, once effective, and later blocked, may become effective again when conditions similar to those under which it had been blocked present themselves.

A girl of eight, fond of dancing and always mimicking dancers, attends the showing of a picture portraying life in the submerged areas of New York forty years ago. The abbreviated dresses of saloon dancers attract her attention. On coming home she freely reënacts the dances, raising her dress in doing so. On noticing it, the mother tells her that short dresses are *bad*, and that the only reason she had been taken to see the picture was to learn the difference between good and bad conduct.

The following day the child does something for which she is reprimanded. The enraged mother demands that the child explain her behavior. The child does not reply. Instead she is seen slowly raising her dress until it is at the level midway between the knees and the buttocks. In the light of the behavior of the day preceding, the child's answer was along a blocked motor-pathway. The child's symbolic answer was: "I'm bad."

Another case, in which the origin of a gesture is traced to the immediate conflict is given below. Here we see not merely a

recrudescence of a conflict and the tensions coincident to it, but the actual genesis of the conflict, and the blocking of a motor-path, which is but partly successful.

Subvocally, I recognize the desire, while at the dinner table, of getting up and going away from it just after eating. Nevertheless, I suppress this recognized desire, and remain seated. Immediately afterwards, without recognizing it right away, I start to bring my feet up and down on the floor. Explanation: I suppressed the complete act, but my feet slipped into motion and were going away from the table nevertheless.

Here the fact of importance is that, because of the repression, the solution of the conflict becomes a partial expression of the organism, a detached manifestation of an effector-system which was supposedly blocked. A similar instance is reported by another subject.

I want to remark that sometimes an action initiated under certain circumstances may not be noticed until some moments later. The following incident is an illustration. I moved my left knee while standing and glancing at my notes. I did not know the origin of the movement. Then it came to me that I had glanced at a card, and was going to reach down to get it, but instead my attention became absorbed in some other line of thought. I am pretty sure the movement was a delayed result of my intention to get that card.

A similar illustration, showing clearly the presence of conflict, and the attempted "escape" of an impulse over a blocked road, with certain laryngo-visceral results, is given in the following instance:

I am sitting at the dinner table sipping from a glass of milk after a meal, and thinking. A certain incident, involving my mother and brother, had just occurred. I remember that my parents tell me on such occasions as this that they support me, or us, and I think in response to this thought that I should tell them that, all the same, that has nothing to do with the necessity of bringing us up properly (so far as teaching us what is right is concerned). I have been sipping down the milk. At this point my breathing system functions improperly, and I almost choke on a gulp of milk. I see the connection.

Knowing that gestures are emotionally-charged behavior-patterns, and that emotion is the result of inhibition, we evidently have to understand the nature of inhibition in order to understand more fully the nature of these gestures. We find that inhibition, or blockage, occurs when an individual is capable of using two outlets for a given impulse and can, in the nature of things, employ only one. In the case of gestures of the autistic type, the blocked motor-path evidently becomes an outlet for



impulses which might, under propitious circumstances, have utilized it in the first place. This may explain why a certain organ or system of organs becomes necessarily involved in a given gesture, and it also explains why, in a given conflict, several organs or organ-systems might be utilized in the disposal of inhibited impulses.

Thus we may conclude that gestural behavior, detached from the normal flow of impulses into channels previously conditioned, is a manifestation of (a) conflict, (b) blockage, and (c) escape of impulses shunted by conflict into effector-systems which would, if uninhibited, become the normal outlets for the impulses involved. When a given situation reinstates a preëxisting conflict, the gesture that becomes visible is a compulsion sign of the blockage that had occurred in the original situation. With some variations, this gesture may recur every time that the conflict is revoked, and continue until the conflict (by some form of adjustment) is solved, and normal outlets are open to the individual again.

With this as a theoretical foundation, we proceeded to the study of a total personality. The aim was to analyze the developmental account of an individual, with special reference to the interpretation of autistic gestures. The expectation was that such a comprehensive study, plus the situational data gathered from a careful examination into the unconscious attitudes of the subject, would throw further light on the nature of these inhibitions. Above all, it was thought that such a study would point the way to a technique which might be employed in the clinical study of autistic gestures.



## CHAPTER SEVEN

### PERSONALITY ANALYSIS IN RELATION TO AUTISTIC GESTURES

In making the proposed analysis of our subject we engaged as a control an individual possessing as many characteristics as possible similar to those of the subject. The questions which arose in conjunction with the analysis were many, but the most important appeared to us as follows:

1. Are words specifically related to gestures indicative of personal conflicts? If so, could these be determined?
2. Are other individuals likely to respond emotionally to the stimuli that had led to emotional responses in a given subject?
3. Does the similarity of complex-indicators in two subjects—one of whom is a control—necessarily invalidate the specificity of gesture-stimuli?

*Controlled personality study.* A. B., previously given two association tests, in which the crucial words were derived from her gestural responses, and the non-crucials were selected from a dictionary, was engaged as the experimental subject in this study. It will be recalled that in both tests the crucials remained the same, while the non-crucials varied. C. D., a control-group member in a previous experiment, was engaged as a control in this experiment, and given test two. The results obtained were thus comparable with those obtained for A. B., so far as the crucials in *either* test were concerned; but, as regards the non-crucials, only those of A. B.'s second test could be compared.

C. D.'s record was not chosen at random. The aim was to select some subject—from among the several controls employed in the original experiment—who would show a similar distribution of complexes to that of A. B., at least so far as the crucials were concerned. Statistically such an overlap in one instance is, of course, of little significance. For purposes of intensive study,

TABLE 14  
A COMPARATIVE STUDY OF COMPLEXES DETECTED IN SUBJECT A.B. AND CONTROL C.D.

Crucial Words— Tests I and II	Frequency of Complex Indi- cators— A.B., Test I	Frequency of Complex Indi- cators— A.B., Test II	Frequency of Complex Indi- cators— C.D.	Non-Crucial Words— Test I	Frequency of Complex Indi- cators— A.B., Test I	Non-Crucial Words— Test II	Frequency of Complex Indi- cators— A.B., Test II	Frequency of Complex Indi- cators— C.D.
1. Gland	1	1	2	Abandon	1	Machine	1	1
2. Mother	1	1	3	Each	2	Zeal	3	3
3. System	0	1	3	Jackal	1	Yankee	1	0
4. Contraction	4	2	1	Oak	0	Wafer	0	0
5. Overactive	4	3	1	Tarnish	0	Vagabond	2	2
6. Muscles	0	2	3	Yacht	1	Ultimate	1	0
7. Woman	2	2	2	Gab	0	Table	0	0
8. Duct	2	2	4	Macaroni	1	Sack	0	0
9. Died	2	2	1	Ugly	0	Race	2	0
10. Men	1	3	1	Sabbath	0	Quadrangle	2	2
11. Beginning	0	1	1	Babble	1	Pacific	1	1
12. Evoke	2	2	2	Fable	1	Oar (Ore?)	1	1
13. Body	1	1	2	Quack	0	Naive	3	2
14. Stimulus	1	1	1	X-Ray	0	Laboratory	1	0
15. Emotional	3	3	3	Keen	1	Kaiser	0	0
16. Liver	2	1	4	Cab	0	Jail	0	0
17. Primitive	3	1	2	Rabbit	0	Ideal	1	0
18. Work	1	2	0	Hammer	0	Habit	3	3
19. Puzzling	1	1	2	Wabbly	1	Gag	0	0
20. Unconcerned	4	3	2	Pace	2	Fabric	0	2
21. Connection	1	1	3	Nab	1	Daily	2	3
22. Nodules	6	3	1	Label	0	Eager	0	0
23. Unusual	2	1	2	Dabble	1	Baby	2	2
24. Believe	0	3	1	Vacancy	1	Abbreviate	2	2
25. Stupid	0	0	0	Ice	1	Cabbage	0	3
Total Complex Indicators	44	43	47		16		28	27

however, this seemed to represent the type of material that might answer some of the questions which we had set before us in this study. Indeed, we could hardly select a case more challenging than that of a control whose associations to another subject's crucial words showed her to possess *more* complex words than the subject had proved to possess (Table 14).

The problem as to how two individuals may manifest similar emotional loads, when tested by similar techniques and the same list of stimulus-words, is one which brings us at once into the field of personality study. We know, from the work of other investigators, that, in regard to reaction-time for instance, the responses of a given individual tend to correlate with his own responses on a later test to the extent of 0.65, and that the average correlation of the responses of two individuals is approximately 0.15 (40). If this indicates a trend in word-association tests, it makes the results previously obtained in C. D.—as compared with those in A. B., whose gestures served as a basis for the selection of the crucials—at least unusual.

In order to ascertain whether or not this matter of emotionality was not traceable to a greater "transference" to the instructor who administered the test, we applied Jung's known formula for what he has termed "psychic resistance" in association tests (19). Jung's term could probably be more satisfactorily called the resistance-ratio of the subject. The ratio which Jung proposed to establish in such cases is derived from the formula

$$\frac{\text{mean association time}}{\text{median association time}},$$

and this, it will be remembered, might be said to measure the general emotional attitude of the subject during the test.

Applying this formula to our subjects, we find, in Table 15, that all the ratios are significantly near normal, and that the difference between C. D.'s ratio and the ratios of A. B. is very slight indeed. If we discount the validity of the first ratio obtained for A. B. on the ground that the first test had been given by an assistant (and not the instructor), and that for that reason



she showed somewhat greater resistance to the test, we have only the second ratio to go by; and this obviously is too little different from C. D.'s ratio to deserve serious consideration.

Thus we see that the two subjects we have had to deal with were equally normal in their attitude toward the general test-situation, and that C. D. was, in general, evidently less adjusted emotionally, than was the experimental subject. This perhaps explains why C. D. proved herself to possess a greater crucial, as well as general, emotional load than A. B. It does not explain, however, how two individuals, unknown and unrelated to each other, and merely chance members of the same classroom situation, when given a certain test, could manifest a large number and variety of similar complexes.

TABLE 15  
AN ANALYSIS OF MEAN AND MEDIAN REACTION-TIMES IN DISCRETE TESTS  
GIVEN SUBJECT A. B. AND CONTROL C. D.

	A. B. Test I	A. B. Test II	C. D.
Mean Association Reaction-Time.....	2.6	3.1	3.1
Mean Reproduction Reaction-Time...	4.2	4.2	6.7
Median Association Reaction-Time....	2.0	3.0	3.1
Resistance Ratio $\frac{\text{Mean A.R.T.}}{\text{Median A.R.T.}}$	1.30	1.03	1.00

*Comparative developmental likenesses.* Two attacks on our problem were devised and executed. One of these consisted in giving the subjects *free-chain* association tests, in supplementation of the previously given tests. These tests included the twenty-five crucial words, on general principles, and also the seven non-crucial words in response to which both subjects had manifested emotional behavior.

The other approach consisted in asking the subjects to prepare life histories. Frankness and completeness were urged. The life histories were written in informal style, and handed in shortly. A. B. had written about 5,000 words and C. D. about 10,000 words. The papers were first analyzed for comparable trends in the backgrounds of the subjects. Of these the following may be given as a summary:

## LIKENESSES BETWEEN A. B. AND C. D.\*

1. Children of parents of the same religious denomination, of the same racial extraction, and of the same nativity.
2. Born in 1913, eight months apart.
3. Oldest daughters.
4. Traveled extensively.
5. Fathers served in the army, at different times.
6. Mothers went through major operations causing the subjects considerable apprehension.
7. Envied and hated their younger brothers.
8. First-or-second-seat-first-row students in grammar school. Skipped lower grades. Teachers' favorites.
9. Became rather poor students in high school.
10. Severely afraid of the dark since childhood.
11. Frightened by dolls in childhood when shown that the dolls had holes in the heads.
12. Report childhood dreams of being pursued by monsters and being unable to escape.
13. Self-centered, self-assertive as children. Refused to let other children play with their toys.
14. Sublimated their selfishness later, and developed a passion for serving others.
15. Plan to devote their lives to work with children: C. D. as teacher, and A. B. as head of orphanage, to give children "real parental love."
16. Operated on for appendicitis (one at age of twelve, the other at age fifteen) while carrying on unrequited love affairs with male friends.
17. Carried on love affairs at the time of this study.

It will be observed that the subjects had remarkably similar biographical histories. Aside from general similarity of cultural background, age, sex, and ranking order, as daughters, they both evidenced certain temperamental trends attributable to traveling. The similarity of their fathers' training as army men (with all the implications that regimentation of conduct implies so far as the character of the fathers is concerned) is of some general interest here; but more important is the fact that both subjects, as children, had been affected by family crises involving their mothers. Both had been forbidden to see their mothers while the latter were undergoing operations. Both had developed considerable anxiety over their mothers' welfare, and showed the presence of guilt feelings. Their educational careers seem also to have had important points of similarity, starting with the

\* The autobiographies on which this analysis is based may be obtained from the author.

trend of school achievement and ending with the teacher-pupil adjustment.

In the field of emotional repression we again find interesting similarities. The fear of the dark, mentioned by both subjects, seems to have been important enough to have left an indelible impression on them; and, what is most interesting, they both recall having been frightened by the sight of dolls whose hair had been removed, thus showing holes in their artificial heads. Responses of this kind suggest similar conflicts, and point to similar origins of these children's fears. The contents of their childhood dreams, indicating a wish to be possessed by someone who is both feared and desired, suggest certain evident similarity. The egotic adjustments of early days, reported by both subjects, later sublimated to take the form of highly socialized behavior, as seen in their attitudes toward books, toys, etc., give further proof of similar developmental trends in these cases. Their proposed reactions, among others, suggest sublimated hatred toward their younger brothers. Finally, their heterosexual adjustments indicate the possibility of similar conflicts, even if these were differently solved.

Thus, in the light of an evident overlap in cultural background, expressed in the nativity and religion of the parents, on the one hand, and the traditional training of the mothers and the military service of the fathers, on the other, certain types of interparental relations, parent-child relations, and child-stranger relations may be expected to show a considerable degree of sameness. The ecological history of the family, also, as seen in the travels of the members of the two families, may be expected to yield similar temperamental typologies. The emotional development of the two persons, it is true, depended on some concurrent elements which could not be traced to a common root, except on the general basis of cultural-ecological similarity. Their school behavior and vocational plans may be taken to have been conditioned directly by the family cultures of our subjects. So, too, the general tenor of their dreams and the individualized attitudes assumed by the subjects in their childhood, could be traced to the cultural milieu. But, of course, there always remain accessory



manifestations which could not be aligned with general factors of the types already mentioned. Rather, they must be correlated with what were undoubtedly similar, though not necessarily identical, factors in their interactional history. This applies also to the gradual sublimation of the individualistic adjustments they had made and to the affective outlets which they had found for themselves.

*Comparative developmental differences.* There is more to be said on the negative than on the affirmative side of the comparison of these totally unrelated individuals who chanced to become subjects in this experiment. Below we give a list of differences which are even more impressive than are the likenesses.

#### DIFFERENCES BETWEEN A. B. AND C. D.\*

- | A. B.   | C. D.   |
|---|---|
| 1. Family background that of tradesmen and unadjusted factory workers.  | 1. Family background that of middle-class, fairly well to do, merchants.  |
| 2. Father jack-of-all-trades, and poor provider.  | 2. Father substantial business man and good provider.   |
| 3. Father shiftless generally, and away during the war.   | 3. Father never away from family, except when mother and C. D. were traveling.  |
| 4. Father brusque and indifferent.  | 4. Father affectionate, and gave C. D. a good deal of attention.  |
| 5. Hates father. Feels very much indebted to mother, and states that mother is "dependent" on her.                        | 5. Devoted to father more than to mother.   |
| 6. Traveled with mother and father, as economic necessity.  | 6. Traveled with mother, at father's expense, merely for pleasure.  |
| 7. Disobeyed and lied to parents, keeping lies to herself; and gloried in her secretiveness. Was exceedingly mischievous. | 7. No mischievousness or indirectness. Disobeyed mother once, but felt extremely conscience-stricken as a result (at age thirteen). |
| 8. When under ether (during appendectomy) dreamed of colliding trains and soldiers fighting, causing "awful crash."       | 8. When under ether (during appendectomy) dreamed of nurse, turned witch, choking her. Woke up and threw pillow at her.             |
| 9. Relatively self-supporting for some time.  | 9. Dependent on parents always.   |
| 10. First child. Has a younger brother and sister.  | 10. Second child. Has two brothers: one older and one younger.  |

\* The autobiographies on which this analysis is based may be obtained from the author.

## A. B.

11. Was an only child till age five.
12. In conflict with brother, took him out and "forgot" to bring him back.
13. No physical defects. Received "perfect baby prize" in childhood. Near death in attack of appendicitis in childhood.
14. Sought company of children, only to domineer over them. Was argumentative and aggressive.
15. No special sensory or motor phenomena reported.
16. No "nervous" experiences reported.
17. Introduced to sex at age five, through little girl friend; was given facts about birth by mother, but was told never to speak of sex matters again.
18. First romantic affairs took form of "secret love" for grown men. First boy-friend at fifteen.
19. Reports having been much sought after. Now has a mutual love affair with a young man, but is anxious about future.

## C. D.

11. When she was three, a younger brother was born.
12. In conflict with brother, decided to run away from home. Felt like "adopted child," and envied brother.
13. Attacked by infantile paralysis at nine months, suffering left hemiplegia. Was left with somewhat paralyzed arm causing her to be self-conscious and repeatedly humiliated.
14. Shunned company of children. Built up imaginary world, and found solace in games with dolls and in image of herself as queen ordering obedient servants around.
15. Had hallucinatory experiences following nightmares. Also, once walked in her sleep.
16. "Nervous breakdown," lasting two weeks, following mountain climb.
17. Introduced to sex in traumatic experience with adult, at thirteen, but told her mother, and was given sex information.
18. First romantic affairs with boy of own age at ten.
19. Reports having been suddenly left by boy friend, Don. Generally had discouraging experiences with boy-suitors. Could not attain affection of the boys she most desired as her friends.

We note here, first of all, a difference in socio-economic status which had probably affected the relations between these daughters and their parents. A. B. had a father who was generally indifferent and often violently abusive, and C. D. had a father who was considerate and attentive to her wishes. C. D. also was obedient to her mother, and manifested guilt-feelings when she failed to confide in the mother; while A. B. took the stand that she owed her mother no accounting, and, unable to communicate her thoughts to the father, chose to repress them. The dream



under ether reported by C. D. thus suggests fear of the mother (the witch), her competitor; while that of A. B. suggests fear of the punishing father (soldiers fighting).

The differences in ordinal position are accounted important: A. B. had no younger sibs to fear as competitors, until the age of five, while C. D. was born a second child and entered into competition with a younger sib at the age of three. Both, however, later, made neurotic adjustments to their younger sibs, in somewhat different ways. The method used by C. D. was that of envy and overt escape. On the part of A. B. it was envy, too, but her approach was by way of repression, *viz.*, she "forgot" to bring the youngster home after she had gone with him for a walk. In their contacts with children, again, they differed in directness of approach; A. B. sought friends in order to compensate for her difficulties by aggressively domineering over them; while C. D., shunning the company of children, developed by the route of introversion, *viz.*, day-dreaming and the playing of "imaginary" games. This, in turn, was followed by hallucinatory behavior and an ultimate "breakdown" for which no details are given. In view of her otherwise satisfactory adjustment, this aspect of C. D.'s development may be related to the paralytic stroke which occurred soon after birth, and which for many years thereafter was responsible for discrimination on the part of normal children and for various traumatic episodes.

As the years go on, C. D. makes a relatively adequate adjustment to her physical handicap. A shrunken deltoid is all that remains of the paralysis, after a long period of treatment by specialists. Her left arm is of the same length as the right one, and is virtually under complete control. She learns (a) that most people do not notice her defect; (b) that she can embrace a dancing partner, stretching her left arm to proper length; and that (c) she can do most things which other people can do, such as piano-playing, writing, etc. Her teachers encourage her, and she emerges with a somewhat changed attitude. This influences, to some extent, her sex adjustment also. It will be noticed that C. D. sustained a traumatic shock along sex lines at thirteen, and that the mother, taken into her confidence, resolved her tension.



Her approach with boys, therefore, since the age of ten, when she had her first pre-adolescent "love affair," was always direct and somewhat aggressive. This was partly a result of her fear of ineffectiveness. Boys, nevertheless, shunned her, and those she attempted to know more intimately seemed always unattainable.

A. B., on the other hand, received her first sex knowledge at the age of five, but was forced quickly to repress it. Her adventures with the opposite sex were, consequently, of the cautious, secretive sort. She pursued an evasive course, and gloried in her ability to "woo over the telephone," unbeknown to her suitors and applauded by her girl friends. Being evasive and non-committal, she was sought after and had numerous suitors.

Here, then, we see a congeries of personal factors which give the two subjects the emotional problems with which they were loaded at the time that they offered their help in connection with this study. Again the family pattern looms large, this time not as a common moulding factor, but as a diversely conditioning factor. A punishing father and a fearful, tolerant mother combine to produce one type of personality. An indulgent father and a mother sometimes concerned and sometimes seemingly indifferent (because of her younger child) lead to a different type of personality. A child possessed of perfect physique develops a verbalized self-pattern (conception of her rôle) which permits aggressive-compensatory activity. A child with a withering arm and an immobile side may retreat from reality and fix the responsibility where it does not belong. Finally, where a child is sexually traumatized, but later treated with patience and understanding, she develops directness in heterosexual contacts; whereas a child that is over-protected or sternly suppressed by an elder, develops an attitude of fearful evasion, and consequently a different type of social adjustment.

*Comparative free-chain associations.* The problem of how personalities which are, in large measure, different may come to have ostensibly similar complexes is still with us. We have seen, of course, that a good deal of similarity may be explained on the basis of cultural influence and parent-child relationship. We have no way, however, of accounting specifically for the test

A COMPARATIVE STUDY OF DISCRETE AND FREE-CHAIN ASSOCIATIONS OF A. B. AND C. D., SHOWING SIMILAR AND DISSIMILAR COMPLEX REFERENCES \*

Stimulus-Word	Discrete Association and Number of Complex Indicators		Free-Chain Association	
	A. B.	C. D.	A. B.	C. D.
1. Died	a. Gone (2)	a. Black (2)	Dead — coffin — color — gray — cemetery — stone — ground — road — flowers — inscription — I've never been to a funeral; just what I've heard of. But I have often wished my father dead.	Black — coffin — satin flowers — people — tears — hearse — machine — undertaker service — I've recently lost a dear aunt. The funeral made an awful impression on me.
2. Overactive	a. Too much work (4) b. Nervous (3)	a. Tired (1)	Jumping — running — playing ball — dancing — fidgeting — My younger sister is always jumping, hopping around; never quiet for a minute; I like her pretty well. This sister is the youngest of the family. I'm the very opposite of her.	Tired — playful — (Laughs) — games — lively — Mother bawled me out so many times for staying out late on dates.
3. Liver	a. Pancreas (2) b. Pantry (1)	a. Body (4)	Beginning — early — first — (Blocked) — uncultured — uncivilized — Thinking of simple, uncultured people. I used to call the primer in the first grade my primitive reader — Mother often recalls it. I've kept all my school work from the third grade on.	Old — (long pause) — backward — narrow-minded — I'm thinking of my dad. He is very narrow-minded on bleaching hair, using rouge, etc. Says there is nothing like following old methods.
4. Connection	a. Tie (1) b. Tie (1)	a. Tie (3)	(Delay) — tie — wires — radio — lamp — Makes me think of connecting radio. You usually tie wires together. I like to do this kind of work. Sometimes it means relationship between people, between two things, two nouns or two abstract things; it also means something belonging.	Bond — tie — spring — marriage.





scores, unless we trace carefully each of the responses to the stimulus-words in the tests. Of course, discrete associations remain mystery-words until elaborated by the subject. Elaboration is facilitated by the free-chain association method.

Both A. B. and C. D. were given free-chain association tests. The twenty-three crucials of the original set-up and the five non-crucial words in the second list, to which both subjects had reacted with evident signs of emotion, were used as stimulus-words. Four words—two crucials (*system* and *stimulus*) and two non-crucials (*stupid* and *beginning*) which revealed *no* complexes in A. B. in the discrete association-test—were used as controls in this experiment. Space permits the listing of only a small number of responses secured in this test.

In our case, the subjects, of course, were beginners. The free-associated material, and the interpretations following this material, do not, in every case, indicate the ultimate source of the existing conflict. Where they do not, the reader will find the allusions vague and incomplete. The experimenter, knowing the futility of pressure in cases of this sort, simply recorded the data given. The reader, however, will be able to infer, from the words underscored in this record, what the probable complex-reference in each case might be. He will find sufficient data to decide that, in the majority of the cases, the sources of complexes, and their meanings, are different for each of these subjects. He will find also that, in some cases, there are remarkable resemblances in references made.

Two illustrations will suffice. First, let us take a word from the crucial series. Both A. B. and C. D. responded with marked emotion to the word *Died*. But subject A. B. had done so because she had entertained death-wishes for her father, while C. D. had recently sustained the loss of a favorite aunt, and was somewhat overcome by the funeral ceremony. As our second illustration (from the non-crucial series) we have the word *Vagabond*. A. B., it will be recalled, had an emotional aversion to her father whom the mother often called "vagabond." The father had stayed away from home, refused to support the family, had morganatic love affairs, etc. C. D., on the other hand, had a

"vagabond lover." She had been emotionally attached to the young man, had contemplated marriage, but had been forced to change her plans by the sudden disappearance of the man. Both subjects had, consequently, emotionalized the stimulus-word *Vagabond*, but for diverse reasons. The interactional biographies of these individuals thus explain how the special trends of their development facilitated diverse attitudes to the same stimulus-word.

The original purpose of this discussion was to ascertain how two different individuals could manifest substantially similar frequencies of complexes, and, at the same time, to establish the fact that the words associated to gestures carry emotional freightage sufficient to move an individual to action that is not related to his integrated behavior-pattern of the moment. In order to find the degree to which there had been overlapping in the two series of words and to discover how the complex-indicators had been used to determine probable emotionality, we passed from the results of the discrete-association to those of the free-chain association test. Through the latter we aimed to determine the sources of the subject's complexes. The results obtained indicated (a) that existing conflicts could be, by and large, traced to understandable causal influences, and (b) that the statistical distributions obtained for our subjects gave us comparable data (originating from similar conflicts, though traceable to different sources).

To say this is not to imply that subject C. D. would necessarily have gestured at the mention of the words to which A. B. had responded by gesturing. Whether she might or might not have done so, however, she too had emotional attitudes which were of the same general order, insofar as they had been connected with the same words that proved to be stimuli in the case of A. B. We had not expected to find that subject C. D. had the same method of meeting her problems, or the same solutions for them. Instead, we expected evidence showing that A. B. had complexes connected with the words to which she had gestured (the fact that another person also had complexes connected with them to the contrary notwithstanding), and that the gestures were responses



which, for the time being, expressed A. B.'s private technique of meeting her conflicts as symbolized by the words which she had heard.

*Conflicts, "complexes," and gestures.* Once a gesture has been reliably recorded, so far as its concomitants are concerned, we must see whether these concomitants possess the qualities of genuine stimuli, in the sense that they can actually precipitate responses, for there are several ways of meeting a conflict. One obvious way is the complete resolution of the conflict, and another is the failure to resolve it; but the third possibility—an attempted but unsuccessful resolution—is more often present than not; and it is this third possibility that includes gestural movements. Now, given the specific complex-reference, or the source of the conflict back of the emotionally-toned stimulus-word, and given the gesture connected with it, can we achieve the meaning of the gesture?

Let us, profiting by the preceding analysis of case material (Ch. 6) and of subject A. B., in this chapter, attempt to induce, from the complex-reference of the stimulus-words, what the specific gestures that occurred in A. B. might have meant. We take a few crucial words for this purpose, and list them with their complex-references (based on the free-chain association and the biographical analysis) and the classroom gestures connected with them.

<i>Stimulus</i>	<i>Class Gesture</i>	<i>Complex-Reference</i>
Duct	Scratches cheek.	Indigestion; fear that her "glands are out of order." Inferiority based on health.

The complex-reference is to fear and inferiority. Scratching the cheek may be a reinstatement of a slap, *viz.*, cheek punishment. Since she speaks of chronic constipation (a conditioned inhibition?) it is entirely plausible that the gesture was a persistent, if unsuccessful, attempt at the resolution of a conflict based on the function of elimination.

<i>Stimulus</i>	<i>Class Gesture</i>	<i>Complex-Reference</i>
Overactive	Looks at wrist watch.	Younger sister active. Envy; and claim to opposite type of behavior.



The reference here is to the "Cain complex," involving the younger sister, of whom she had been envious and with whom she was undoubtedly in competition. Looking at the watch is evidently a response to the classroom situation, meaning: How soon will this be over? How soon can I get away? It is, in other words, the expression of an escape tension. It will be recalled that she had run away from her younger brother when she had gone for a walk with him, and it will be noticed that escape is the solution suggested by the superior (more active) qualities of her young competitor.

<i>Stimulus</i>	<i>Class Gesture</i>	<i>Complex-Reference</i>
Died	Looks at ring on left hand. Lowers arm to seat, looks down on it, and then braces arm and relaxes.	Death-wishes for father.

The death wishes expressed by A. B. in the course of free-association supply the material for interpretation. Unable to reconcile herself to the father, the subject has developed an attitude of fear toward her prospective marriage. "Looking at the ring," especially where the ring is on the left hand, indicates at once the reference of the stimulus-word to marriage and the interconnection between her admitted death-wishes for the father and her dread of the father-substitute. The movement sequence, consisting in lowering, looking at, bracing, and relaxing the arm, is evidently a symbolic expression of the simple phrase "To seek support." If marriage means anything, it means that, conventionally; and other free-associations point to it as being A. B.'s conception and justification of marriage in her own case.

<i>Stimulus</i>	<i>Class Gesture</i>	<i>Complex-Reference</i>
System	Pulls pen from holder, and puts it back	School-achievement. Reading difficulty. Poor memory for "authors."

If the school-achievement conflict is at the bottom of the gesture here involved, we may take the word *System* to imply the regularization of tasks, the control of one's behavior, such that she may again be the excellent student that she had been in the grades. Pulling the pen out, and returning it into position, may,

for one thing, symbolize the wish for return to *status quo*. There may be other implications not so evident in the associations given by the subject, but we have to confine ourselves to the data as given.

<i>Stimulus</i>	<i>Class Gesture</i>	<i>Complex-Reference</i>
Work	Hands clasped, looks at finger-nails intently.	Father's unemployment. Self-pity due to hard work.

Free-association here refers to the father's unemployment, and arouses a self-pitying attitude due to the fact that she must be self-supporting. The usual association between work and tender fingernails is well known. No woman can have neatly manicured fingernails if, in addition to caring for the house, she is compelled to work at factory labor. A. B., gazing at her fingernails, is expressing a suppressed wish for another type of family-organization. Here the unsocialized attitudes of her childhood, the egotic attitude of the oldest child and only girl in the family, return to define her inhibited motor response.

The larger the collection of gestures, and the more complete the fund of information, the more reliable are the interpretations. We have demonstrated that, even with a minimum of information such as we have obtained from a short autobiography and a few free-associations, we might, using also known facts from the field of developmental psychology, place certain kinds of interpretations on the gestures of a given subject. We might go on with A. B.'s gestures, pointing out that some of her tension-points are revealed through conflicts with her friends, with the mother, with the father (again and again), with her siblings, with the general matter of sex, with her self-confessed inferiorities, with her problem of social status, and so on. To do so would be merely to increase the illustrations without adding substantially to the theoretical propositions laid down.

## CHAPTER EIGHT

### SUMMARY

From the point of view of scientific investigators new concepts and techniques are at least as important as the results of experiments. Since certain new concepts and techniques were found necessary in the course of this work, these evidently belong in a summary of results.

At the beginning of this study certain questions were posed which later became the hypotheses tested in the several experiments. A concluding section deals with the generalizations which serve as answers to these questions.

#### *Concepts and Techniques*

1. The term *autistic* (i.e., self-directed) *gestures* has been offered to describe certain types of overt behavior which have no obvious relation to existing extraorganic stimuli, and are thus defined as explicit responses to intraorganic stimuli.

2. The term *mute gestures* has been offered to apply to autistic gestures occurring in the presence of verbal stimuli, when the learned verbal responses to those stimuli had been previously inhibited.

3. Paired observation in recording *concurrent* word-stimuli and autistic gestures has been employed with the view to testing the reliability of word-gesture connections and as an aid to accuracy in the experiments on gestural consistency.

4. The efficiency-index-differential, as a statistical technique in checking the reliability of data observed by paired observers, has been employed as a refinement of the time-sampling procedure.

5. Controlled word-association, increasingly refined for the validation of the problem, has been used to test the emotional basis of autistic gestures.

6. The mute-association technique has been employed as a variant of the association-test procedure to determine the consistency of autistic gestures.



7. A hypnoanalytic technique aiming to test the reproducibility of autistic gestures has been used as an aid in the problem of gestural consistency.

### *Experimental Findings*

1. One of the most important characteristics of autistic gestures is the fact that they are neither perceived by the actor nor responded to by an observer.

2. Autistic gestures can not be interpreted even by individuals who consciously attempt to interpret them.

3. Being essentially non-conscious, autistic gestures require an "abstracted state" for their appearance and special, indirect, techniques for their study.

4. These gestures are determinable through the stimuli—verbal and probably situational—with which they are associated in time.

5. At least in the "abstracted state," the reproduction of autistic gestures in response to identical stimuli (granted continued latency of conflict) may be expected.

6. Autistic gestures tend to be consistent in their reappearance, as proved by our intensive individual and our hypnotic-trance studies.

7. Autistic gestures originate in conflict situations of which they become symbolic, as proved by the emotional freightage of their stimuli.

8. Stimulus-words applicable to the study of autistic gestures are catalytic agents—intensifying latent conflicts of individuals—and thus raising inhibited impulses to the level of overt expression.

9. The theory of autistic gestures is that, in the presence of conflict and blockage, there may be an escape of impulses into effector-systems which, were the impulses uninhibited, would provide normal outlets for them.

10. The evidence from biographical and test material suggests the applicability of gesture analysis to personality study.

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## APPENDIX

### A LIST OF AUTISTIC GESTURES OBSERVED IN OR REPORTED BY EXPERIMENTAL SUBJECTS

1. Adjusting glasses
2. Adjusting pen-clip
3. Adjusting seat
4. Adjusting trousers in genital region
5. Back-slapping
6. Back-stepping
7. Balancing pencil on finger
8. Belching
9. Bending matches
10. Bending or stooping down
11. Bending toes upward
12. Biting inside of cheek
13. Biting lips
14. Biting nails
15. Blinking eyelids
16. Blowing into fist
17. Blowing nose
18. Blowing through lips
19. Blowing through nostrils
20. Blowing up cheek
21. Blushing
22. Bobbing up and down in seat
23. Bottling lips
24. Breaking matches
25. Brushing hands
26. Brushing nose
27. Brushing parts of clothing
28. Buttoning up collar or coat
29. Carrying hand to pocket
30. Chewing pencil
31. Clasping hands
32. Clasping hands behind neck
33. Clasping knee
34. Clasping wrist
35. Cleaning nails
36. Clearing throat
37. Clenching fist
38. Clicking teeth
39. Closing book
40. Closing eyes
41. Closing fountain pen
42. Clucking
43. Collecting saliva at tip of tongue
44. Combing hair
45. Compressing lips
46. Coughing
47. Cracking joints
48. Cradling objects
49. Creasing trousers
50. Crossing arms or legs
51. Cupping hands over chin
52. Cupping hands over mouth
53. Dilating nostrils
54. Displaying teeth
55. Drawing circles with toes
56. Drawing feet together
57. Drawing feet under body
58. Drawing head in
59. Drawing lips into mouth
60. Drawing nasal secretion into mouth
61. Drooping eyes
62. Dropping arms
63. Dropping objects
64. Erasing paper
65. Erecting penis
66. Examining book, pages, etc.
67. Exhaling
68. Extending arm
69. Fidgeting
70. Filling in sand between legs (at beach)
71. Finger-drumming
72. Finger nose-wiping
73. "Fixing" hair
74. Flexing arm
75. Flexing arm with finger pointing to oneself
76. Flicking fly or speck
77. Flipping pages
78. Folding arms behind back
79. Folding arms on chest
80. Frowning

81. Gazing out of window
82. Giggling
83. Glancing
84. Glancing at hands
85. Grasping objects (hat, pocket-book, etc.)
86. Grinding teeth
87. Grinning
88. Grunting
89. Hiccoughing
90. Hissing
91. "Hm"-ing
92. Holding abdomen
93. Holding arm above or below elbow
94. Holding fingers together
95. Holding head upright
96. Holding objects
97. Hunching shoulders
98. Humming
99. Inhaling deeply
100. Inserting hand beneath shirt or vest (Napoleonic gesture)
101. Inserting hand or finger into fist
102. Inserting pencil between pages
103. Inspecting fingernails
104. Inspecting hands
105. Inspecting tie
106. Jerking hands
107. Jangling money in pocket
108. Kicking-foot movement
109. Kissing parts of own body, fingers, hands, elbows, legs, etc.
110. Kneading wrist
111. Lacing fingers
112. Laughing
113. Leaning against wall
114. Leaning on chair or table
115. Leaning on elbows
116. Leaning forward
117. Leaning head backward or sideways
118. Leaning head on wall or door
119. Leaning jaw on fist
120. Licking finger or fingers
121. Licking teeth with tongue
122. Lifting skirt or shirt
123. Lifting trousers
124. Looking at watch or clock
125. Looking up, down, around, sideways, etc.
126. Making sucking or smacking sounds
127. Manipulating genitals
128. Manipulating outside objects
129. Manipulating personal objects (tie, etc.)
130. Massaging abdomen
131. Massaging knee
132. Moving legs apart
133. Moving jaw from side to side
134. Moving lips
135. Moving objects
136. Moving ring up and down finger
137. Munching
138. Nodding head
139. Opening and closing objects
140. Opening mouth
141. Paling (in face)
142. Passing gas
143. Patting abdomen
144. Patting chin
145. Patting person, animal, or object
146. Pausing
147. Picking ear
148. Picking nose
149. Picking finger
150. Picking lips
151. Pinching cheek
152. Pinching ear
153. Pinching nose
154. Pivoting on heels
155. Placing arm or hand between thighs
156. Placing finger under nose
157. Placing fist on forehead
158. Placing foot on supporting object
159. Placing hand or hands on hips
160. Placing hand or hands in hip-pockets
161. Placing hand or hands over mouth
162. Placing non-edible objects in mouth
163. Placing palm on forehead
164. Placing teeth on lower lip
165. Placing toes in pigeon-toe position
166. Placing tongue in cheek
167. Playing with navel
168. Plucking fingers
169. Plucking hairs from brows or head

170. Plucking hairs from genital region
171. Plucking hairs from nose or axilla
172. Pouting
173. Pressing foot against wall
174. Pressing hands together
175. Pressing knees together
176. Protruding lower jaw
177. Protruding tongue
178. Pss-ing
179. Puckering lips
180. Puffing
181. Pulling clothes downward
182. Pulling ear
183. Pulling pencil-point out
184. Pulling pencil through fingers
185. Pulling skin at "Adam's apple"
186. Pulling up knees
187. Punching chin
188. Punching paper
189. Pushing finger through button-hole
190. Pushing ring off finger
191. Raising arm or arms
192. Raising eyebrows
193. Reaching for handkerchief
194. Regurgitating
195. Releasing fountain-pen filler
196. Resting lips on hand over fist
197. Resting mouth on wrist
198. Resting on heels
199. Resting on toes
200. Resting thumbs in suspender loops
201. Retracting tongue
202. Revolving ring around finger, or bracelet on wrist
203. Rising (rhythmic) on toes
204. Rocking
205. Rolling crumbs
206. Rolling eyes
207. Rolling head
208. Rolling paper
209. Rolling pencil between palms
210. Rolling thumbs
211. Rolling up sleeves
212. Rotating hand or palm
213. Rotating elbows with hands in back pockets
214. Rotating object in lap
215. Rubbing above shoe
216. Rubbing against table
217. Rubbing eyebrows
218. Rubbing eyes
219. Rubbing fingers
220. Rubbing lips with knuckles
221. Rubbing one thumb nail against another
222. Rubbing teeth with thumb
223. Rubbing thigh
224. Running hands through hair
225. Scraping buttons on suit
226. Scraping lips
227. Scratching abdomen
228. Scratching anal opening
229. Scratching arm-pit
230. Scratching desk with finger-nail
231. Scratching fingers
232. Scratching forehead
233. Scratching hand
234. Scratching legs
235. Scratching neck
236. Scratching nose
237. Scribbling
238. Scowling
239. Setting jaw
240. Setting teeth
241. Shaking foot, knee, or legs
242. Shaking hand at wrist
243. Shifting feet or legs
244. Shifting weight from one foot to another
245. Shrugging shoulders
246. Shuddering
247. Shutting lips with finger
248. Sighing
249. Sitting on hands
250. "Sizing-up" eye movement
251. Slapping hands on table
252. Slouching in chair
253. Smacking lips
254. Smiling
255. Smoothing brows or hair on head
256. Smoothing clothes
257. Snapping fingers
258. Snapping pen-clip
259. Snatching at object (tie, etc.)
260. Sneering
261. Sneezing
262. Snickering
263. Sniffing
264. Snoring
265. Spitting (convulsive)
266. Spitting (with tip of tongue)
267. Spreading fingers
268. Squatting



269. Squatting-rising movement
270. Squeezing arm or leg of another
271. Squeezing own arm or leg
272. Squinting eye
273. Stammering
274. Standing book on edge
275. Standing on one leg
276. Starting (as when frightened)
277. Stifling yawn
278. Stomach-growling
279. Straightening legs
280. Stretching
281. Stretching fingers
282. Stretching neck
283. Striking foot with fist
284. Stroking beard, head, or mustache
285. Stuttering
286. Sucking finger
287. Sucking gums
288. Sucking lips
289. Sucking objects (beads, etc.) in mouth
290. Sucking tongue
291. Supporting arms with hands
292. Supporting face with hands
293. Suspending pencil from mouth, teeth, or lips
294. Swallowing saliva
295. Swaying buttocks
296. Switching (turning) lips
297. Taking objects apart
298. Tapping abdomen
299. Tapping back of head
300. Tapping feet
301. Tapping on fingers
302. Tapping out rhythm of melody
303. Tearing (crying)
304. Tearing paper
305. Throwing chest forward
306. Throwing-off-coat motion
307. Thrusting hand open
308. Thumbing through book
309. Tickling
310. Tilting in chair
311. Touching things
312. Turning aside
313. Turning pencil end over end
314. Turning to look
315. Twiddling fingers
316. Twirling mustache or imaginary mustache
317. Twisting foot
318. Twisting hair
319. Twisting head
320. Twitching mouth
321. Unclasping fingers
322. Uncrossing legs
323. Unfolding hands or arms
324. Waving hands
325. Wetting fingers
326. Wetting lips
327. Whistling
328. Wiggling toes
329. Winding watch
330. Winking
331. Wiping eyes
332. Wiping lip-border
333. Wiping nose
334. Wiping objects
335. Wiping pen-point
336. Withdrawing pelvis (sitting motion)
337. Wringing hands
338. Wrinkling forehead
339. Wrinkling nose
340. Yawning

